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ABSTRACT

Individualized units of math instruction related to each of several occupations in 14 occupational clusters comprise the high school career-related math curriculum. An introductory booklet provides students with general information on the clusters; when students have selected an occupation that interests them, they take the packet of instructional materials for that occupation, complete the pretest, and, in conference with the teacher, decide whether to continue the unit or to concentrate first on any math skills in which the pretest has revealed a deficiency. Each instructional unit relates information about a career and about home management in a personalized narrative, which contains problems requiring specific math skills. The materials include facsimiles of forms used by persons employed in the occupation; the authors recommend supplementing these with actual source materials. Contained in the document are the students' introductory booklet, the kits of instructional materials, pretests and posttests, answer keys, a student record sheet, and recommendations for teachers on procedures. The materials were prepared by a team of Minnesota math teachers and a work experience coordinator, after their students identified the jobs in which they were most interested. The units present fictional persons pursuing occupations which follow traditional sex-role expectations. (Author/AJ)

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CAREER RELATED MATH UNITS

TEACHER'S EDITION

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November 1971

William Heck
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CE005685

Independent School District 281
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INTRODUCTION

"A career-oriented set of units for basic high school math just has to be a good thing." That is so easy to say and few would disagree; however, it is more difficult to produce than it would seem.

Some questions this writing team had to face were:

Which careers should we center the math around?
How can we make it interesting and meaningful?
How can we keep it from becoming too difficult?
How can the package be put together so as to be most usable?
What approach will allow for the most creative individual use on the part of the teacher?

The package turned out to be a reusable informational packet relating to a number of job clusters, and a set of consumable 'units' written in narrative form with math problems presented which would typically be faced in that particular job. The units are intended to be used by the students, written in, and kept. The cluster information will serve as the introduction and should be read by the student before he chooses a particular unit to work. To check on this approach by the student, questions are sometimes placed in the pretest section of the units which refer back to the cluster information.

The units themselves were chosen after surveying 100 students at Robbinsdale Senior High School who were currently enrolled in general math classes. They were asked to check those areas of work which most interested them, from a list of 80 jobs. Those jobs checked more than nine or ten times were placed on the unit list.

The units were written using as practical an approach as possible, and only after interviewing a person actually involved in that job. The purpose of the interview was to find the math-related tasks of each occupation. In some instances, the more basic applications were concentrated on to keep the unit from becoming too difficult for these particular students. The writers tried to keep the reading and math as simple as possible to best meet the needs of the more basic eleventh and twelfth grade math students. Some units appear more successful in meeting the writer's goals than others.

Note: It might be desirable for an individual teacher to group the units according to the degree of difficulty and/or the specific math skills emphasized in a particular unit.

The clusters and the units included in each are listed on pages four and five.

MATERIALS

Cluster Information: The materials that have been written as a part of this project are organized under the career cluster concept. A cluster is a broad category under which several related careers can be listed. Example: Sales Cluster has been designated cluster one and has six different career units.

For each broad category or cluster, information has been gathered and published as a book apart from the career units themselves. This will allow the student to survey a cluster before he does any specific career units.

MATERIALS

Career Units: Each career unit will contain information relative to the career as well as problems relating to the specific math skills required. The units were written to give a personalized approach rather than a telling informational approach. Some units have a math pretest near the beginning, so the student can see at the outset those math skills he may need to work on. The units are packaged in a kit with each kit containing 10 copies of every unit. It is hoped that this will make an adequate classroom set.

Student Record Sheets: A record sheet is provided for each student which may be kept either by the student or the teacher or both.

PROCEDURE

The career units are meant to be used under an individualized approach to instruction. Each student should begin by reading in the Cluster Information book. He should look through the list of clusters to find one of interest to him. After he has read the cluster information, he may choose to work on one of the career units that are listed for the cluster. He should then go to the career kit and get a copy of the particular unit he wishes to work on. The student should work on the unit up through the pretest where one is provided. After he has completed the pretest the student should check with his teacher for correction of the pretest. The teacher and the student together should decide whether he should continue the unit or at this point work with some math skills where deficiencies showed up on the pretest. It is at this point that a time limit for the completion of the unit should be agreed upon by the student and the teacher.

Each student should be required to keep a three-ringed notebook in which he will put the units that he has completed as well as the unit he is presently working on. This procedure will allow the teacher to check on the students regarding how much work they have completed as well as what they are presently working on. These notebooks should probably be kept in the classroom and allowed out only with special permission of the teacher.

The number of units to be completed will vary depending upon the units themselves and the additional work that a student may need to do on his math skills.

It is suggested that a teacher keep a file box of test items with two or three test items for each career unit. One or several of these items can be given to the student when he has completed the unit. This will allow the teacher an additional check on the work the student has done.

OTHER RECOMMENDATIONS

Some of the units make use of tables or graphs (withholding charts, parts lists and prices, etc.). The necessary information is always included in the unit to enable the student to complete the unit; however, there are distinct advantages to having the source material for these tables and graphs available to the student so that experience can be gained in their use. The pamphlets and booklets used are referred to in the individual units, but a list follows:

OTHER RECOMMENDATIONS

*E.I.S. Hydraulic Service Catalog-39H
E.I.S. Automotive Corporation, Middletown, Connecticut

*Airtex Fuel Pump Catalog-AX86
Airtex Automotive Division, Fairfield, Illinois

*Blue Streak Ignition Parts Catalog-IG-23
Standard Motor Products, Incorporated
37-18 Northern Boulevard
Long Island City, New York 11101

*Available at most auto parts stores, or from the manufacturer

1971 Circular E Employer's Tax Guide
Department of Treasury
Internal Revenue Service

Minnesota Income Tax Withholding Tables and Instructions
Department of Taxation
Centennial Office Building
658 Cedar Street
St. Paul, Minnesota 55101

Further resource materials of value would be:

Occupational Outlook Handbook
Encyclopedia of Careers, Vol. 1 and 2
Any career information

Close work with the counselor in these units could uncover many other possibilities for better use of the package.

As contact is possible with individuals actually employed in the job unit areas, revision and updating of these units are recommended.

LIST OF CAREER UNITS

I. Sales

1. Department Store Clerk
2. Service Station Attendant
3. Route Salesman
4. Auto Salesman
5. Cashier
6. Advertising

II. Insurance

1. Insurance Salesman and Adjuster

III. Construction

1. Carpenter
2. Electrician
3. Plumbing
4. Operating Engineer (Heavy Equipment)
5. Surveyor

IV. Medical and Health

1. Laboratory Assistant
2. Ward Secretary
3. Dental Assistant
4. X-ray Technician

V. Secretarial and Clerical

1. File Clerk
2. Typist
3. Auto Parts Counterman
4. Receptionist and PBX Operator

VI. Mechanical Occupations

1. Auto Mechanic
2. Small Appliance Repairs
3. Tool and Die Maker
4. Machinist

VII. Driving Occupations

1. Race Car Driver
2. Commercial Truck Driver

LIST OF CAREER UNITS

VIII. Personal Services

1. Barber
2. Beautician -- Cosmetologist
3. Child Care
4. Stewardess
5. Interior Decorator

IX. Performing Arts

1. Radio Announcer
2. Cameraman and Photography
3. Musicians
4. Small Bands
5. Artist -- Commercial and Regular

X. Government Jobs

1. Mailman
2. Policeman
3. Air Traffic Control
4. Recreation and Park
5. Forestry Technician

XI. Utilities

1. Lineman
2. Telephone Repairman

XII. Manufacturing and Supply

1. Warehouse and Stocking
2. Inventory Control

XIII. Printing and Publishing

1. Printing

XIV. Home Management

1. Personal Finances
2. Selecting a Home
3. Food Purchase
4. Clothing Construction
5. Buying and Caring for a Car
6. Computing Take-home Pay

CAREER RELATED MATH UNITS

STUDENT RECORD SHEET

____
Name

Cluster	Unit	Date Started	Date Finished	Supplementary Math Work	Related Projects	Comments
I Sales	1					
	2					
	3					
	4					
	5					
	6					
II Insurance	1					
III struction	1					
	2					
	3					
	4					
	5					
IV edical and ealth	1					
	2					
	3					
	4					
V retarial and erical	1					
	2					
	3					
	4					
VI hanical upations	1					
	2					
	3					
	4					

STUDENT RECORD SHEET

Cluster	Unit	Date Started	Date Finished	Supplementary Math Work	Related Projects	Comments
VII Driving Occupations	1					
	2					
VIII Personal Services	1					
	2					
	3					
	4					
	5					
IX Performing Arts	1					
	2					
	3					
	4					
	5					
X Government Jobs	1					
	2					
	3					
	4					
	5					
XI Utilities	1					
	2					
XII Manufacturing and Supply	1					
	2					
XIII Printing and Publishing	1					

STUDENT RECORD SHEET

Cluster	Unit	Date Started	Date Finished	Supplementary Math Work	Related Projects	Comments
XIV Home anagement	1					
	2					
	3					
	4					
	5					

APPENDIX:

ANSWER KEYS

ANSWER SHEET -- UNIT 1-1

Department Store Clerk

1. $29.88
2. $31.06
3. $2.03
4. $3.50
5. $84.37
6. $107.22
7. $9.33
8. $6.13
9. $7.50
10. $9.81
11. b
12. b

- - - - - - - - - - - - -

13. $100.00
14. $17.78
15. $ .53
16. $18.31
17. $1.69
18. $240.02
19. $44.68
20. $40.22
21. $17.23
22. $117.57
23. $46.23
24. $10.14
25. $58.06
26. $26.94
27. $18
28. $60.07
29. $34.98
30. $7.83
31. $22.37
32. $12.52
33. $11.27
34. $9.13
35. $22.05
36. $9.36
37. $64.00
38. $19.20
39. $83.20
40. $17.85
41. $65.35

ANSWER SHEET -- UNIT 1-2

Service Station Attendant

1. $10.70
2. $ 7.67
3. $ 7.05
4. $ 2.51
5. $ .81
6. $ 3.92
7. $ 3.40
8. $ 4.14
9. $ 4.31
10. $62.98

	No. of Quarts	Cost	Sales Tax	Total Cost
23.	1	$ .35	$ .01	$ .36
24.	3	1.05	.03	1.08
25.	20	7.00	.21	7.21
26.	12	4.20	.13	4.33
27.	220	77.00	2.31	79.31

11. 2 pennies, 1 nickel, 1 dime, 2 quarters, and 1 $5 Total change $5.67
12. 3 pennies, 1 dime, 1 quarter, 4 $1
13. 1 penny, 1 nickel, 1 quarter
14. 3 pennies, 1 dime, 1 $1
15. 2 pennies, 1 dime, 3 quarters, 2 $1, 1 $10
16. 4 pennies, 2 dimes, 1 $5, 1 $10
17. $17.20
18. $11.39
19. $ 5.70
20. $57.50
21. $113.19
22. $30.69

Sales slips for these problems are on the following five pages.

UNIT 1-2

18.

LICENSE NO. ____

NEW CAR WARRANTY PLATE NO. ____

CAR CARE SERVICE

No. 289729

CAR MODEL AND MAKE ____

DATE ____

MILEAGE ____

NEXT SERVICE DUE ____

NAME ____

ADDRESS ____

CITY ____ STATE ____

TIME WANTED ____

PICK UP ☐ DELIVER ☐

PHONE NUMBER ____

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING

☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
	Radiator hose	4.50
	1/2 hour labor	4.75
	@ 9.50	
	TOTAL PARTS	4.50
	TOTAL LABOR	4.75
	TOTAL	9.25

SERVICE AND PRODUCTS

DESCRIPTION-QUANTITY UNIT PRICE	AMOUNT
GASOLINE ☐ ☐ ☐ ☐	
MOTOR OIL ☐ CHANGE SAE ____	
BRAND ____ QTS # ____	
OIL FILTER TYPE ____	
LUBRICATION ☐	
TRANSMISSION ☐ CHECK ☐ CHANGE ____ QTS LBS # ____	
DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS # ____	
WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
PCV SERVICE ☐ CLEAN ☐ REPLACE TYPE	
OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
COOLING SYSTEM ☐ CHECK ☐ GRP ☐ CLEANER ☐ PROTECTOR ☐	
☐ ATLAS PERMA GUARD	
☐ FROST GUARD ____ GAL # ____	

TIRES PERCENT WORN	L.F.	R.F.	L.R.	R.R.	SPARE	AMOUNT
REPLACE						
ROTATE ☐						
REPAIR ☑						2.00
WHEEL BALANCE						

WHEEL ALIGNMENT ☐	
BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____	
CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS	
OTHER MAINTENANCE ENGINE TUNE UP ☐	
BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE	
FUEL FILTER ☐ REPLACE TYPE ____	
AIR CONDITIONER ☐	
FAN BELTS ☐ WIPER BLADES ☐	
☐ ☐	
TOTAL SERVICE & PRODUCTS	2.00
ENTER HERE	9.25
SUB TOTAL	11.25
TAX MUNICIPAL $ %	
TAX STATE SALES OR USE $ %	.14
TOTAL AMOUNT	$ 11.29

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me [illegible] to be listed at your regular prices. I agree to pay cash when work is completed [illegible] to you, and until paid in full I shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection [illegible] including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

LOCATION

TIME	CONTACT	ARR.	COMPL.

UNIT 1-2

19. LICENSE NO. ____

NEW CAR WARRANTY PLATE NO. ____

CAR CARE SERVICE

No. 289729

CAR MODEL AND MAKE ____

DATE ____

MILEAGE ____

NEXT SERVICE DUE ____

NAME ____

ADDRESS ____

CITY ____ STATE ____

TIME WANTED ____

PICK UP ☐ DELIVER ☐

PHONE NUMBER ____

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING

☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
	TOTAL PARTS	
	TOTAL LABOR	
	TOTAL	

SERVICE AND PRODUCTS

✓	DESCRIPTION-QUANTITY-UNIT PRICE	AMOUNT
	GASOLINE ☐ ☐ ☐ ☐ 2 34.9¢	.70
	MOTOR OIL ☐ CHANGE SAE ____	
	BRAND ____ QTS ____	
	OIL FILTER TYPE ____	
	LUBRICATION ☐	
	TRANSMISSION ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
	MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
	P.C.V SERVICE ☐ CLEAN ☐ REPLACE TYPE	
	OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
	AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
	COOLING SYSTEM ☐ CHECK ☐ CAP ☐ CLEANER ☐ PROTECTOR ☐	
	☐ ATLAS PERMA GUARD	
	☐ FROST GUARD ____ GAL. ____	
	TIRES PERCENT WORN → L.F. R.F. L.R. R.R. SPARE	
	REPLACE	
	ROTATE ☐	
	REPAIR ☐	
	WHEEL BALANCE	
	WHEEL ALIGNMENT ☐	
	BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____	
	CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS	
	OTHER MAINTENANCE ☐	
	BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE	
	FUEL FILTER ☐ REPLACE TYPE ____	
	AIR CONDITIONER ☐	
	FAN BELTS ☐ WIPER BLADES ☐	
	☑	5.00
	TOTAL SERVICE & PRODUCTS	
	ENTER HERE	

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me for which I have authority to order, to be listed at your regular prices. I agree to pay cash when work is completed, or on satisfactory terms to you, and until paid in full it shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection costs, including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

LOCATION

ACCOUNT	ARR.	COMP.

TAX MUNICIPAL SALES %

STATE SALES OR USE %

TOTAL AMOUNT $ 5.70

4

20.

CAR CARE SERVICE

No. 289729

LICENSE NO. ____

NEW CAR WARRANTY PLATE NO. ____

CAR MODEL AND MAKE ____

DATE ____

MILEAGE NEXT SERVICE DUE ____

NAME ____

ADDRESS ____

CITY ____ STATE ____

TIME WANTED ____

PICK UP ☐ DELIVER ☐

PHONE NUMBER ____

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING

☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
	Wheel	10.50
	Tire	29.50
	ex. tax @.01	.30
	TOTAL PARTS	40.30
	TOTAL LABOR	
	TOTAL	40.30

SERVICE AND PRODUCTS

✓	DESCRIPTION-QUANTITY-UNIT PRICE	AMOUNT
	GASOLINE ☐ ☐ ☐ ☐	
	MOTOR OIL ☐ CHANGE SAE ____	
	BRAND ____ QTS ____	
	OIL FILTER TYPE ____	
	LUBRICATION ☐	
	TRANSMISSION ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
	MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
	PCV SERVICE ☐ CLEAN ☐ REPLACE TYPE	
	OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
	AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
	COOLING SYSTEM ☐ CHECK ☐ GRP ☐ CLEANER ☐ PROTECTOR ☐	
	☐ ATLAS PERMA-GUARD ☐ FROST GUARD ____ GAL. ____	
	TIRES → L.F. / R.F. / L.R. / R.R. / SPARE	
	REPLACE	
	ROTATE ☐ REPAIR ☐	
	WHEEL BALANCE	
	WHEEL ALIGNMENT ☐	
	BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____	
	CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS	
	OTHER MAINTENANCE ENGINE TUNE-UP ☐	
	BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE	
	FUEL FILTER ☐ REPLACE TYPE ____	
	AIR CONDITIONER ☐	
	FAN BELTS ☐ WIPER BLADES ☐	
	☐ TOWING ☑	16.00
	TOTAL SERVICE & PRODUCTS	
	ENTER HERE →	40.30

SUB TOTAL	56.30
TAX MUNICIPAL $ %	
TAX STATE SALES OR USE $ .3 %	1.20
TOTAL AMOUNT	$ 57.50

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me for which I have authority to order, to be listed at your regular prices. I agree to pay cash when work is completed, or on satisfactory terms to you, and until paid in full it shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection costs, including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

LOCATION

TIME | CONTACT | ARR. | COMPL.

5

UNIT 1-2

21. LICENSE NO. ____

NEW CAR WARRANTY PLATE NO. ____

CAR CARE SERVICE

No. 289729

CAR MODEL AND MAKE ____

DATE ____

MILEAGE NEXT SERVICE DUE ____

NAME ____

ADDRESS ____

CITY ____ STATE ____

TIME WANTED ____

PICK UP ☐ DELIVER ☐

PHONE NUMBER ____

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING
☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
3	Tires	
	@ 28.90	86.70
1	Tire	
	@ 14.45	14.45
	excise tax @ .01	1.01
	TOTAL PARTS	102.16
	TOTAL LABOR	
	TOTAL	102.16

SERVICE AND PRODUCTS

✓	DESCRIPTION-QUANTITY-UNIT PRICE	AMOUNT
	GASOLINE ☐ ☐ ☐ ☐	
	MOTOR OIL ☐ CHANGE SAE ____	
	BRAND ____ QTS ____	
	OIL FILTER TYPE ____	
	LUBRICATION ☐	
	TRANSMISSION ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
	MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
	PCV SERVICE ☐ CLEAN ☐ REPLACE TYPE	
	OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
	AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
	COOLING SYSTEM ☐ CHECK ☐ GRP ☐ CLEANER ☐ PROTECTOR ☐ SOLDER	
	☐ ATLAS PERMA GUARD ☐ FROST GUARD ____ GAL ____	

TIRES	L.F.	R.F.	L.R.	R.R.	SPARE	AMOUNT
REPLACE						
ROTATE ☐ REPAIR ☐						
WHEEL BALANCE ✓	X	X	X	X		8.00

DESCRIPTION-QUANTITY-UNIT PRICE	AMOUNT
WHEEL ALIGNMENT ☐	
BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____	
CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS	
OTHER MAINTENANCE [illegible] TUNE-UP ☐	
BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE	
FUEL FILTER ☐ REPLACE TYPE ____	
AIR CONDITIONER ☐	
FAN BELTS ☐ WIPER BLADES ☐	
☐ ☐	
TOTAL SERVICE & PRODUCTS	8.—
ENTER HERE	102.16

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me [illegible] have authority to order, to be listed at your regular prices. I agree to pay cash when work is completed or on satisfactory terms to you, and until paid in full it shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection costs, including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

LOCATION

TIME: CONTACT | ARR. | COMPL.

SUB-TOTAL		110.16
TAX	MUNICIPAL $ + %	
	STATE SALES OR USE $ + 3 %	3.03
TOTAL AMOUNT		$ 113.16

22. LICENSE NO. ____

CAR CARE SERVICE

No. 289729

NEW CAR WARRANTY PLATE NO. ____

CAR MODEL AND MAKE ____

DATE ____

MILEAGE ____

NEXT SERVICE DUE ____

NAME ____

ADDRESS ____

TIME WANTED ____

CITY ____ STATE ____ PICK UP ☐ DELIVER ☐

PHONE NUMBER ____

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING
☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
	Recharge air conditioner labor	14.00
	TOTAL PARTS	
	TOTAL LABOR	
	TOTAL	14.00

SERVICE AND PRODUCTS

✓	DESCRIPTION-QUANTITY UNIT PRICE	AMOUNT
	GASOLINE ☐ ☐ ☐ ☐	
	MOTOR OIL ☑ CHANGE SAE ____ BRAND ____ 5 QTS. .85	4.25
	OIL FILTER TYPE ____	3.95
	LUBRICATION ☐	
	TRANSMISSION ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS ____	
	WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
	MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
	PCV SERVICE ☐ CLEAN ☐ REPLACE TYPE	
	OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
	AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
	COOLING SYSTEM ☐ CHECK ☐ CAP ☐ CLEANER ☐ PROTECTOR ☐	
	☐ ATLAS PERMA GUARD ☐ FROST GUARD ____ GAL. ____	
	TIRES: L.F. / R.F. / L.R. / R.R. / SPARE; REPLACE; ROTATE ☐; REPAIR ☐; WHEEL BALANCE	
	WHEEL ALIGNMENT ☐	
	BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____	
	CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS	
	OTHER MAINTENANCE ☐	
	BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE	
	FUEL FILTER ☐ REPLACE TYPE ____	
	AIR CONDITIONER ☑ 2 lbs. Freon @2	4.00
	FAN BELTS ☑ WIPER BLADES ☐	4.00
	TOTAL SERVICE & PRODUCTS	16.20
	ENTER HERE →	14.00
	SUB TOTAL	30.20
	____ 3	.49
	TOTAL AMOUNT	$ 30.69

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me for which I have authority to order, to be listed at your regular prices. I agree to pay cash when work is completed, or on satisfactory terms to you, and until paid in full it shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection costs, including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

ANSWER SHEET -- UNIT 1-3

Route Salesman

1. 448
2. 410
3. 400
4. $20.40
5. $61.20
6. $15.30
7. $103.70
8. a. $32.64
   b. $78.49
   c. $42.09
   d. $153.22 total

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9. 145
10. 131
11. 238
12. 514
13. a. 52 b. 31
14.

1 case,	type 1,	8 oz.		$ 1.67
2 cases,	type 1,	12 oz.		$ 3.66
2 cases,	type 1,	16 oz.		$ 3.84
3 cases,	type 1,	16 oz.	diet	$ 5.76
7 cases,	type 2,	16 oz.		$13.44
5 cases,	type 3,	8 oz.		$ 8.35
1 case,	type 3,	16 oz.		$ 1.92
21 Total			Total cost	$38.64

15. $14.45
16. $24.19
17. $34.98
18. $12.75
19. $22.23
20. a. $25.05
    b. $36.60
    c. $38.40
    d. $48.00
    e. $54.90
    f. $51.84
    g. $55.11
    h. $48.00
    i. $48.00
    j. $405.90
    k. $99.45
    l. $306.45
21. $9.19
22. $297.26
23. 260 cases
24. 264 left
25. $343.68
26. $13.00

ANSWER SHEET -- UNIT 1-4

Auto Salesman

1. $70
2. $210
3. 4 years 1 month
4. $120
5. $7
6. $200
7. $695
8. $600
9. $1,095.37
10. $4,031

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11. $14,180
12. 208
13. $68.17
14. $70
15. $675
16. $1,955
17. $2,781
18. $775
19. $2,255
20. $148.75
21. $376.25
22. $492.50
23. $567.50
24. $3,880
25. $2,840
26. $1,920
27. $17,600

ANSWER SHEET -- UNIT 1-5

Cashier

1. 127.49
2. $13.89
3. $20.50
4. $4.66
5. 209.46
6. $8.75
7. 5.18
8. $79.07
9. 864
10. 44.15

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11. $100
12. $225.11
13. 6.75
14. $231.86
15. a. $111.65
    b. $3.35
    c. $115
    d. 1 - $5 bill
16. a. $13.18
    b. $ .40
    c. 13.58
17. $313.10
18. 164.80
19. 21.63

20. 30.00

21. 50.00

22. 39.37

23. 305.80

	24. Sue	25. Alice	26. Roberta	27. JoAnn	28. Isabelle
Hours:	72	65	80	80	80
Wages:	$148.32	$133.90	$164.80	$164.80	$164.80
O.T.:			16	1	27
Wages:			$ 49.44	$ 3.09	$ 83.43
Commissions:	$ 61.23	$190.70	$ 71.98	$210.57	$321.25
Gross:	$209.55	$324.60	$286.22	$378.46	$569.48
Status:	M	S	M	S	S
Exemptions:	0	1	4	0	5
Fed. W/H:	$ 26.10	$ 49.50	$ 22.90	$ 63.10	$ 79.50
F.I.C.A.:	$ 10.90	$ 16.88	$ 14.88	$ 19.68	$ 29.61
State W/H:	$ 6.60	$ 13.40	$ 9.30	$ 16.30	$ 28.70
Health Plan:		$ 3.18	$ 3.18	$ 3.18	$ 3.18
Net Wages:	$165.95	$241.64	$235.96	$276.20	$428.49

29. $1,768.31

30. $1,750.85

31. $100

32. $1,650.85

33. 34 dimes

34. 25 nickels

35. 12 pennies

36. $4.77

37. 1,655.62

ANSWER SHEET -- UNIT 1-6

Advertising

1. 50
2. 2
3. 7.994
4. 82.08
5. $13.64
6. 36.75
7. .175
8. 37.92
9. 4.85
10. 11.20

- - - - - - - - - - - - - -

11. 1
12. 56
13. 28
14. 84
15. 672
16. 84
17. 672
18. 140
19. 420
20. $11.88
21. $14.52
22. $23.93
23. $2.47
24. 3
25. 12
26. $17.40
27. $20.24
28. $50.19
29. $17.28
30. 24
31. 24
32. $1.45
33. $417.60
34. $24
35. $ .94
36. $45.12
37. $462.72
38. $ 69.40
39. $393.32
40. $126.01
41. $ 66.12
42. $532.80
43. $199.69
44. $354.96

ANSWER SHEET - UNIT 2-1

Insurance Salesman and Adjuster

1. $ 3.95
2. $33.75
3. 31.5
4. $ 4.61
5. $25.72
6. a
7. d
8. d
9. c

- - - - - - - - - - - - -

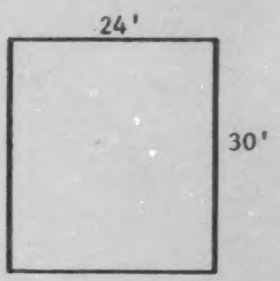
10. $ 25.30
11. $ 4.12
12. $ 98.16
13. $ 39.06
14. $ 23.87
15. $ 16.51
16. $ 53.40
17. $ 6.08
18. $134.50

ANSWER SHEET -- UNIT 3-1

Carpenter

1. 4
2. 4 or approximately 4 1/2
3. 4 1/3' long
4. 99.7
5. .375
6. 952 square feet
7. 3
8. 870,000 in 1968
9. $7.13 per hour 1971
10. P = 43
11. Approximately 44 (43.96 using 3.14)
12. a. 52' 6"
    b. 41' 6"
    c. 38' 3" x 23'
    d. 3'
13. 330
14. 879.75 square feet (38.25' x 23')
15. 72 square feet
16. 2 board feet
17. 10 2/3 board feet
18. 1,200 board feet
19. 1/2 or 1:2 (4:8)
20. 20 feet
21. 1:8 (3 to 24)
22. 23 joists needed

    30' ÷ 1 1/3' = 22.5' = 23



23. a. 40 $\frac{2'' \times 10'' \times 24}{12}$
    b. 920
24. a. $4.32
    b. $99.36

ANSWER SHEET -- UNIT 3-2

Electrician

1. 15
2. 20
3. 2,300
4. 10
5. 47

- - - - - - - - - - - - - -

6. 6,900 watts
7. 13,800 watts
8. 23,000 watts
9. 2
10. 12 (17.39 amp)
11. a. 13.04
    b. 14
12. a. 1,950 watts
    b. 17 amp
    c. 12
13. a. No
    b. Ampere will exceed 15
14. a. 3,105 watts
    b. Two 14's
15. 5.3; 5.3 x 6 = 31.8 or 32 outlets

ANSWER SHEET -- UNIT 3-3

Plumbing

1. 170
2. 136.0
3. 13.9
4. 3,808.08
5. 30
6. 15.26
7. 5.12
8. 1/11 or .09
9. 15 7/8
10. 72
11. c
12. a

- - - - - - - - - - - - -

13. 7.5 inches
14. $21.25
15. 8 pints
16. a. $44.66
    b. $76.10
    c. $120.76

Costs for individual items

3/4" copper	-- 60'	$21
1/2" copper	-- 80'	$16
3/4" 90° elbow	-- 7	$1.12
1/2" 90° elbow	-- 18	$2.16
3/4" connector	-- 3	$ .39
1/2" connector	-- 4	$ .36
Reducer	-- 1	$ .18
3/4" tees	-- 2	$ .34
1/2" tees	-- 4	$ .56

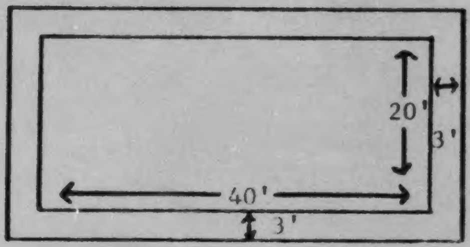
5 pounds solder @ 25 cents per pound $1.25

17. a. $28
    b. $24
    c. $1.60
    d. $1.44
    e. $ .16
    f. $ .81
    g. $ .36
    h. $2
    i. $50
    j. $51
    k. $54
    l. $213.37
    m. $6.40
    n. $219.77
    o. $167.42
    p. $387.19

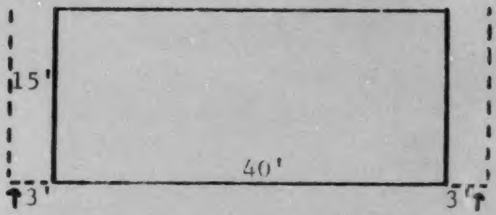
ANSWER SHEET -- UNIT 3-4

Operating Engineer (Heavy Equipment)

1. a.



b.



2. a. A = 800 square feet

   b. A = 1196 square feet

3. a. 27 cubic feet

   b. Depth (or height)

   c. 17,940 cubic feet

   V = 46 x 26 x 15 = 17,940

   d. 664.44 cubic yards

- - - - - - - - - - - - -

4. a. 664.44 cubic yards

   b. 664 cubic yards

   c. 885.33 scoops

   d. 110.67 loads

   e. 37 hours

5. 23,616 cubic feet

6. 14,268 cubic feet

7. 48 cubic yards

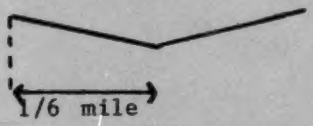
8. 81 trips (80.21)

ANSWER SHEET -- UNIT 3-5

Surveyor

1. a. 211.2" or 17.6' or 5.87 yards

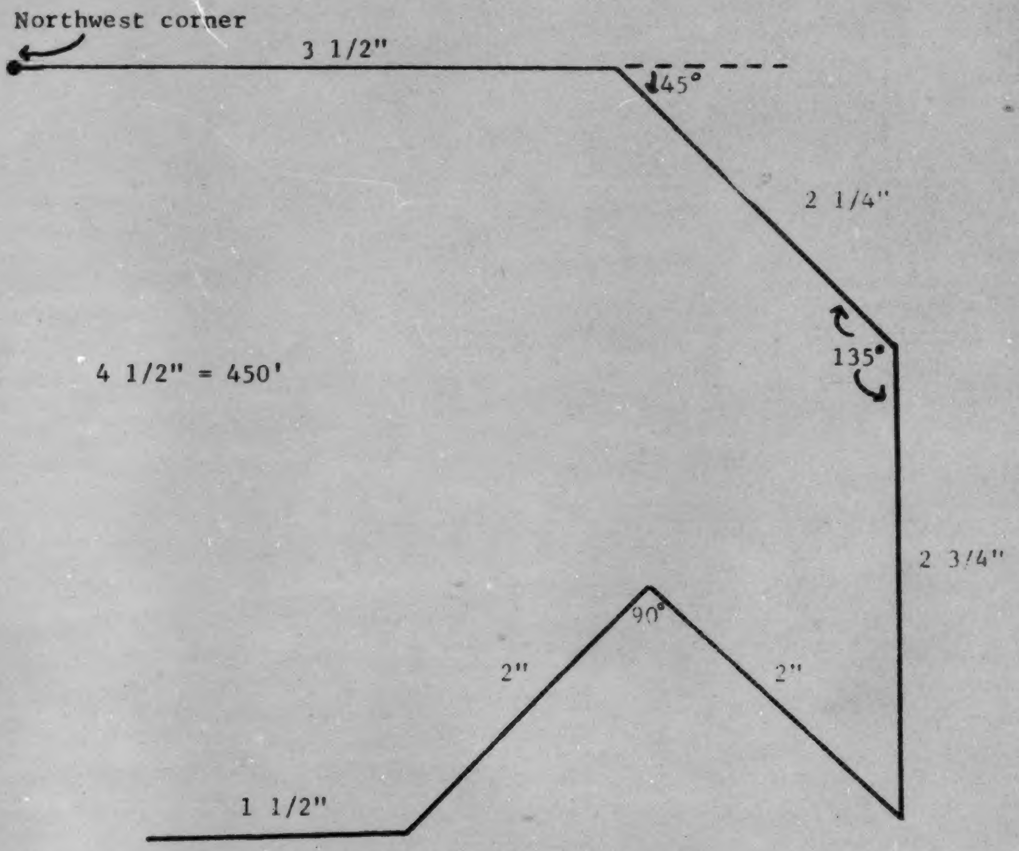
   b.



   c. 35.2" or 2.93'

2. 6" by 3"

3.


Northwest corner
3 1/2"
45°
2 1/4"
135°
4 1/2" = 450'
2 3/4"
90°
2"
2"
1 1/2"

   a. From northwest corner to southwest corner 4 1/2" scale or 450' actual

   b. North to northwest

4. a. From point A go due east 200', southeast 150', due east 300', south 175', southwest 225', west 450', then north 450'

   b. 75' x 100'

c. Point A south 700', east 100'

d. Point G north 175', east 100'

ANSWER SHEET -- UNIT 4-1

Laboratory Assistant

1. 320
2. 160
3. 224
4. 136
5. 204
6. 49
7. 49 g.
8. 49
9. 4.9
10. 25.83 g.
11. 3.65 g.
12. 245 g.
13. .505
14. 10 mg.; 5 mg.
15. 4-1 g.; 1-100 mg.; 1-50 mg.; 3-10 mg.; 1-5 mg.; 4-1 mg.
16. 2-100 g.; 4-10 g.; 1-5 g.; 3-1 g.; 1-.5 g.; 1-50 mg.; 4-10 mg.
17. 4-10 g.; 1-5 g.; 1-1 g.; 1-10 mg.; 1-5 mg.; 1-1 mg.
18. 1-1 g.; 4-100 mg.; 1-50 mg.; 3-10 mg.; 1-5 mg.; 4-1 mg.

ANSWER SHEET -- UNIT 4-2

Ward Secretary

1. a. $31.44

   b. $60.81

   c. 22,151

2. a. 6.889

   b. $4.92

   c. $3.23

3. a. 2,961

   b. 17,112

   c. $1,198.88

   d. 14

- - - - - - - - - - - - -

4. See chart A.
5. See chart B.
6. $1.40
7. $ .79
8. $1.18
9. $2.58
10. $5.95
11. $ .50
12. $1.09
13. $5.00
14. $13.35
15. $3.51
16. $23.45

ANSWER SHEET -- UNIT 4-2

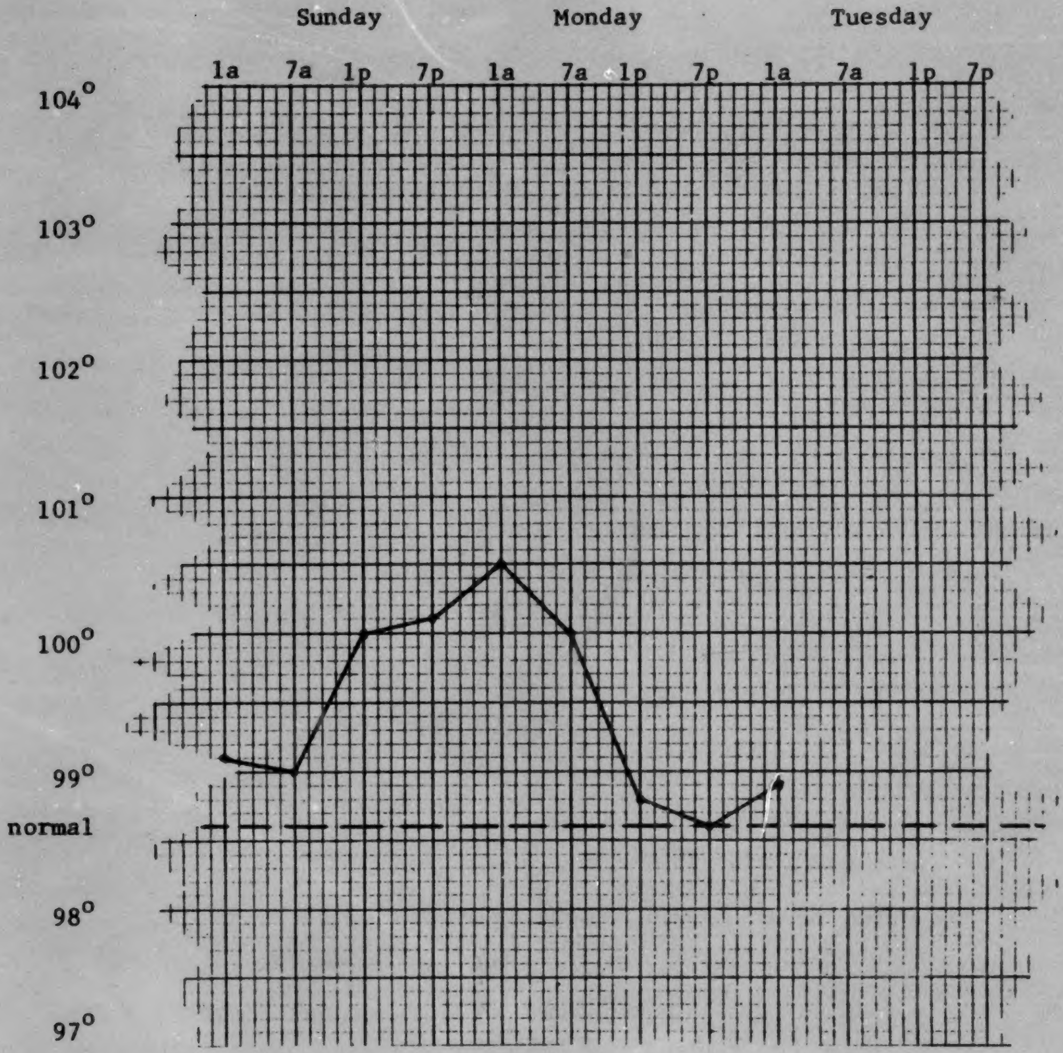


CHART A

ANSWER SHEET -- UNIT 4-2

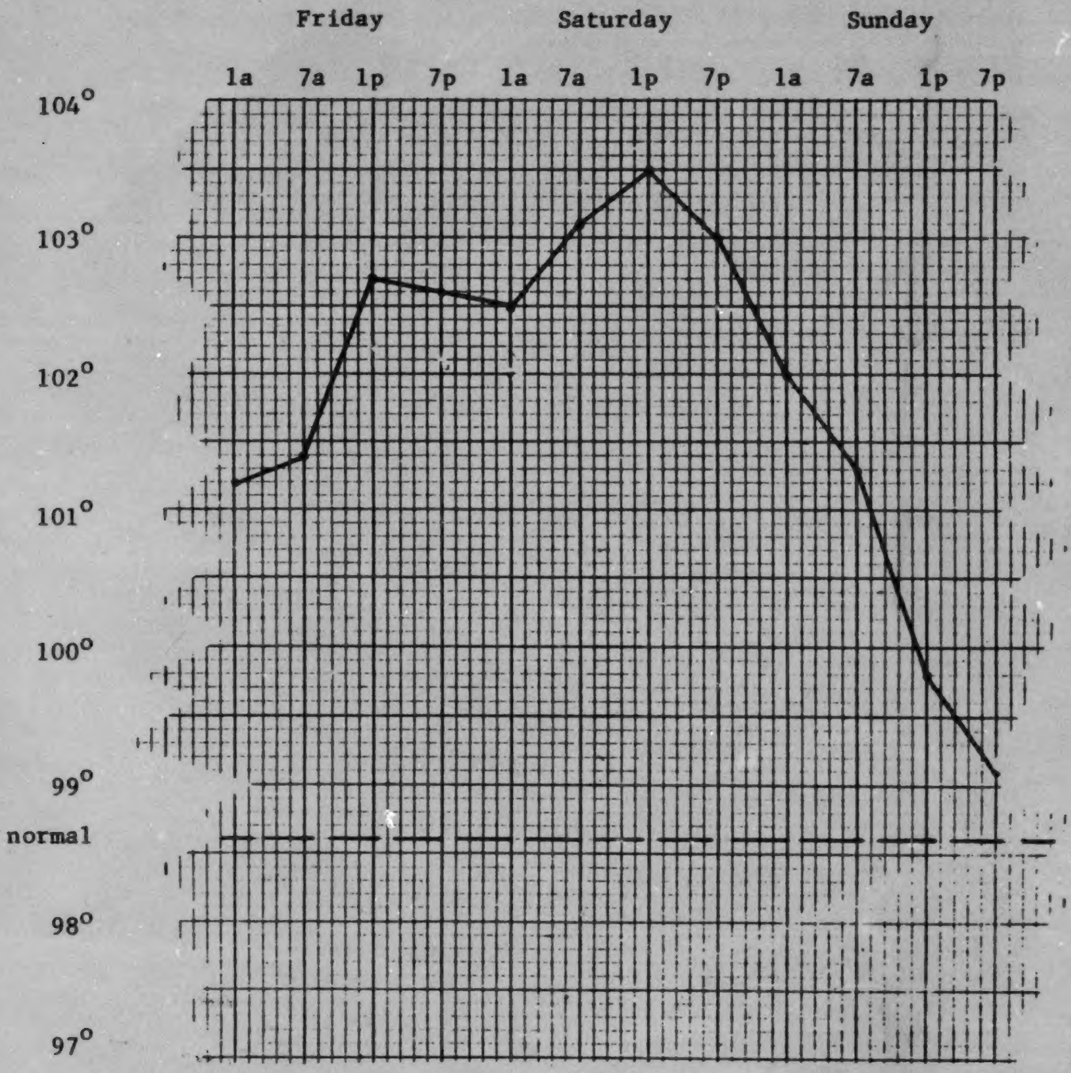


CHART B

ANSWER SHEET -- UNIT 4-3

Dental Assistant

1. a. 242
   b. 4,743
   c. 2,176
   d. $231.60
2. a. $156.50
   b. $ 48.25
   c. $ 14.78
   d. 3,690
3. a. 5
   b. 4.8 or 4 4/5
   c. 14.4 or 14 2/5
   d. 6,179.5
   e. 5,152
   f. 42.24
4. a. 23
   b. 9.01
   c. 5.21
   d. 20.3
5. 150 seconds or 2 minutes 30 seconds
6. No, 8 minutes
7. 7 1/4 hours
8. 32 drops
9. 72 drops
10. 3 3/4 hours
11. 4

ANSWER SHEET -- UNIT 4-4

X-ray Technician

1. a. 20
   b. 6 2/3
   c. 20
   d. 6 2/3
2. a. 25 percent
   b. 50 - 50 percent
   c. 33.3 percent
   d. 37.5 percent
3. a. 100
   b. 225
   c. 625
   d. 289
   e. 4,225

- - - - - - - - - - - -

4. 10 KV
5. 5 KV
6. 32.67 KV
7. Triple
8. .5 (or 1/2)
9. 10
10. 1/40
11. 16
12. 35
13. 6.67
14. 1/9
15. 400
16. 100
17. 1,600
18. 10
19. 60^2 (3,600)
20. 20^2 (400)
21. 90

ANSWER SHEET -- UNIT 5-1

File Clerk

1. a. Thousands

b. Tens

c. Ten thousands

d. Hundred thousands

e. Millions

2. a. 7

b. 3

c. 5

d. 4

e. 6

f. 8

g. 9

h. 10

i. 1

j. 2

3. a. Blaylock, C.

b. Demarcus, J.

c. Doe, J.

d. Edeskuty, A.

e. Edeskuty, P.

f. Gruman, E.

g. Grummons, D.

h. Johnson, C.

i. Johnston, C.

j. Larson, V.

k. Maslewski, J.

l. McPherson, D.

m. Mills, G.

n. Ostlund, E.

o. Rolbiecki, A.

p. Rolbiecki, J.

q. Schmidt, W.

r. Summers, M.

s. Trangle, A.

t. Zurawski, A.

4. a. M348-124012

b. M348-214368

c. M384-222416

d. M591-38016

e. M653-124011

f. M653-124012

g. N389-416891

h. N389-514281

i. N389-514282

j. N389-516281

k. N398-516281

l. N399-516281

m. SU1056-138916

n. SU1056-318916

o. SU1056-318917

ANSWER SHEET -- UNIT 5-1

p. SU1056-318926

q. SU1057-392316

r. SU1057-412316

s. SU1058-392163

t. SU1066-412316

ANSWER SHEET -- UNIT 5-2

Typist

1. 8"
2. 6 1/2"
3. 65
4. 78
5. 40
6. 520
7. 624
8. 260
9. 312
10. 6 minutes 56 seconds
11. 5 minutes 47 seconds
12. 1,872
13. 1,560
14. Elite
15. 550
16. 7
17. 14
18. 770
19. 39
20. 809
21. 7
22. 3,500
23. 123
24. 3,623
25. 199,265
26. 1
27. 2
28. 399
29. 402
30. 27
31. 7
32. 3 1/2
33. 6 minutes 56 seconds
34. 809
35. 93 hours 29 minutes
36. 93 1/2 hours
37. 26.7 days
38. 6 weeks
39. 7 1/2
40. 37 1/2
41. $73.13
42. $3.80
43. $69.33

ANSWER SHEET -- UNIT 5-3

Auto Parts Counterman

1. $37.50
2. $10.12
3. $71.45
4. a. $17.50
    b. $ 8.75
    c. $ 2.45
    d. $28.70
5. 198.51
6. 16.07
7. a. $22.50
    b. $ 5.04
    c. $13.95
    d. $31.96
    e. $73.45
8. C913
9. $2.77
10. $1.86
11. $1.50

12.

UNITED AUTO PARTS

Date______________

Purchaser ______________

Quantity	Stock No.	Description	List	Net	Total
8	4543CAX	'69 COUGAR FUEL PUMP	15.07	8.14	65.12

Sales Tax 1.95

Total 67.07

13.

UNITED AUTO PARTS

Date______________

Purchaser ______________

Quantity	Stock No.	Description	List	Net	Total
4	4194CAX	'68 COMET FUEL PUMP	17.13	10.28	41.12

Sales Tax 1.23

Total 42.35

14.-19. Student is to look up answers in catalogues found in auto shop.

ANSWER SHEET -- UNIT 5-4

Receptionist and PBX Operator

1. 0 hours
2. 50 minutes
3. 0 hours
4. 36 minutes
5. 2 hours
6. 4 minutes
7. 3 hours
8. 30 minutes
9. 3 1/2
10. 3 1/2
11. $19.18
12. a. 8 hours 43 minutes
    b. 8 3/4 hours
    c. $39.94
13. a. 8 hours 50 minutes
    b. 8 3/4
    c. $24.50
14. a. 8 hours 32 minutes
    b. 8 1/2
    c. $31.88
15. a. 2 hours 40 minutes
    b. 2 3/4
    c. $17.88
16. a. 7 hours 40 minutes
    b. 7 3/4
    c. $40.69

17.

	Total Time	%
a.	89 minutes 29 seconds	15.4
b.	104 minutes 42 seconds	18.0
c.	100 minutes 55 seconds	17.4
d.	135 minutes 51 seconds	23.4
e.	149 minutes 54 seconds	25.8
Total	580 minutes 51 seconds	100%

18. Station A. $ 7.61
    B. $ 8.90
    C. $ 8.57
    D. $11.54
    E. $12.73

ANSWER SHEET -- UNIT 6-1

Auto Mechanic

1. a. 4.102
   b. 3.107
   c. 348.075
   d. 250.155
   e. 210
   f. 33.307
   g. 1269.0
   h. 6.45 first answer
   16.383 final answer
   i. 14.839
   j. 13.632
2. a. 3.04
   3.0
   3
   b. 118.38
   118.4
   118

- - - - - - - - - - - - -

3. 294
4. 323.7
5. 4.15
6. 2.075
7. 4.306
8. 270.146
9. 270
10. 233.55
11. 234
12. 16.4
13. 54.9
14. 1.056
15. Larger
16. .765
17. .779
18. .854
19. .860
20. .857

ANSWER SHEET -- UNIT 6-2

Small Appliance Repairs

1. a. $33.40
   b. 482.96
   c. 26.76
   d. 191.23
2. a. $1.002 = $1
   b. 14.49
   c. .80
   d. 5.74
3. a.
$$\begin{array}{r} 18.75 \\ 13.92 \\ \underline{.42} \\ 33.09 \end{array}$$
   b.
$$\begin{array}{r} 4.00 \\ 2.78 \\ \underline{.08} \\ 6.86 \end{array}$$

4. a. $8.00
   b. 19.97
5. .60
6. .70
7. Total bill $29.27
8. 18.66
9. .56
10. 12.00
11. 31.22
12. 19.38
13. .58
14. $28.00
15. 47.96

ANSWER SHEET -- UNIT 6-3

Tool and Die Maker

1. 1 1/16
2. 62 1/2
3. 5
4. 3 3/8
5. .0248
6. 11.794
7. 5.952 inches
8. 7.40 inches; 7.36 inches
9. 1.289 inches

- - - - - - - - - - - - -

10. B = 2 1/2 inches
    C = 4 inches
    D = 2 1/8 inches
    E = 2 7/8 inches
    F = 4 5/8 inches
11. L = 5 5/8 inches
    W = 1 5/8 inches
12. .625
13. .725
14. .587
15. .150
16. 1 11/16
17. 1/8
18. 1 11/16
19. a. 222 r.p.m.
    b. 111 r.p.m.
20. 3490 r.p.m.
21. 9/16
22. a. No
    b. Cast steel
23. 407 r.p.m.

ANSWER SHEET -- UNIT 6-4

Machinist

1. 20
2. 96 11/16
3. 117
4. .03467
5. 3.75
6. 36.7954
7. 14.438
8. 56.367
9. 24.336
10. 3 seconds
11. 14 strokes

- - - - - - - - - - - - -

12.

Largest	Smallest	Tolerance
2.784"	2.778"	.006

13.

Most Turned Down	Least Turned Down	Tolerance
.535	.530	.005

14. .004
15. a. 2 9/16"
    b. 1 7/16"
    c. 11/16"
    d. 8/16 = 1/2"
    e. 9/32
    f. 23/32
    g. 1 13/32
    h. 2 12/32 = 2 6/16 = 2 3/8
16. a. 2
    b. 2
    c. .200
17. a. 3
    b. 3
    c. .075
18. a. 14
    b. 14
    c. .014
19. .289
20. .353
21. 5 5/8
22. 7 9/32
23. 10 30/64 = 10 15/32
24. 1.0781
25. 3.1875
26. 4.2187
27. A = 3.00
28. B = 3.437
29. C = 4.187
30. D = 4.21875

ANSWER SHEET -- UNIT 7-1

Race Car Driver

1. 366 cubic inches
2. 7/16 inch
3. 7.05 liter
4. 1.37 horsepower/cubic inch
5. 1.16 horsepower/cubic inch
6. .132
7.
8.
9. 53.34
10. 426.72
11. Decreased
12. a.

    b.
13. 5 liter
14. 200 laps
15. 400 miles
16. 100 miles
17. 40°
18. 22.5

ANSWER SHEET -- UNIT 7-2

Commercial Truck Driver

1. 579
2. 682
3. 579 = $76.72
4. 682 = $90.37
5. 10 hours
6. 1 1/2 hours
7. 8 1/2 hours
8. 4:20
9. 11:45

- - - - - - - - - - - - -

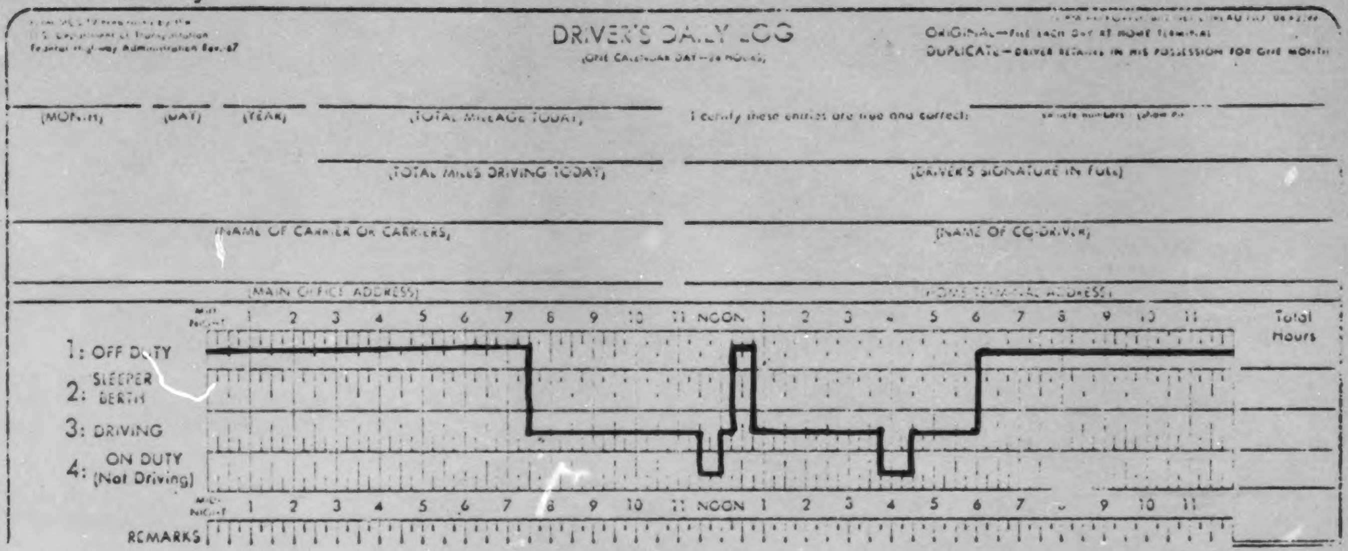
10. 2:30
11. 45
12. 5:15
13. $37.84
14. 1 1/4 hours
15. $8.88
16. $46.72
17. On next page
18. $52.04
19. On next page
20. $43.17
21. $177.62
22. $37.84
23. $310.67

Total deductions $92.25

Net income $218.42

ANSWER SHEET -- UNIT 7-2

17. **Monday**



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Federal Highway Administration Rev.-67

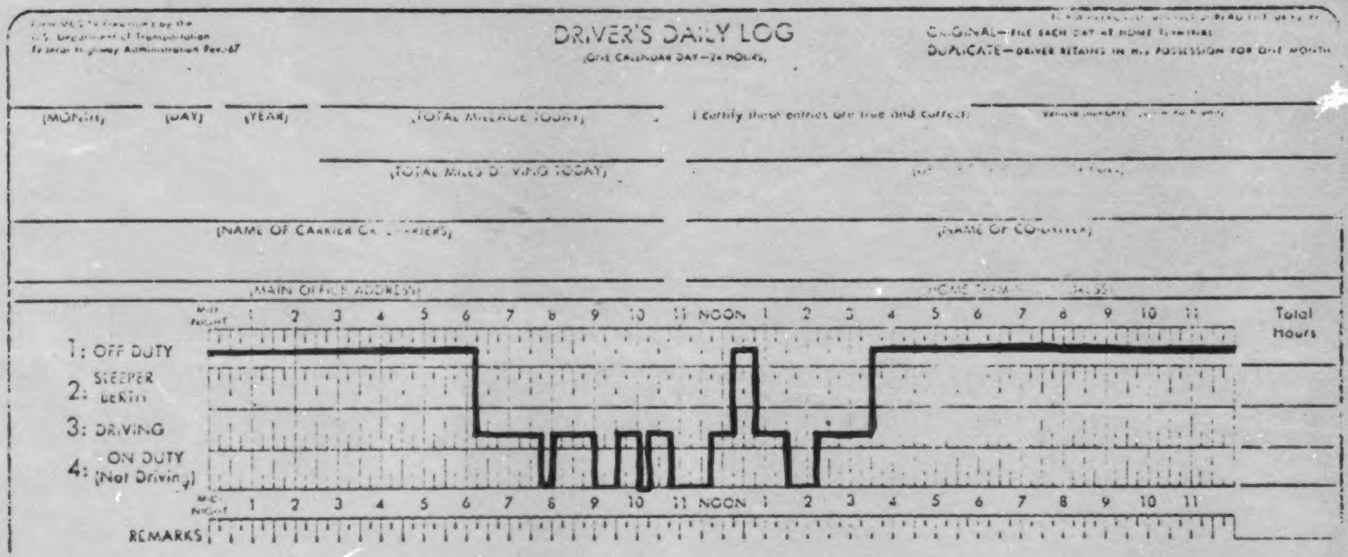
DRIVER'S DAILY LOG
(ONE CALENDAR DAY—24 HOURS)

ORIGINAL—FILE EACH DAY AT HOME TERMINAL
DUPLICATE—DRIVER RETAINS IN HIS POSSESSION FOR ONE MONTH

(MONTH) (DAY) (YEAR)
(TOTAL MILEAGE TODAY)
I certify these entries are true and correct:
(TOTAL MILES DRIVING TODAY)
(DRIVER'S SIGNATURE IN FULL)
(NAME OF CARRIER OR CARRIERS)
(NAME OF CO-DRIVER)
(MAIN OFFICE ADDRESS)
(HOME TERMINAL ADDRESS)

MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11
Total Hours
1: OFF DUTY
2: SLEEPER BERTH
3: DRIVING
4: ON DUTY (Not Driving)
REMARKS

19. **Tuesday**



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DRIVER'S DAILY LOG
(ONE CALENDAR DAY—24 HOURS)

ORIGINAL—FILE EACH DAY AT HOME TERMINAL
DUPLICATE—DRIVER RETAINS IN HIS POSSESSION FOR ONE MONTH

(MONTH) (DAY) (YEAR)
(TOTAL MILEAGE TODAY)
I certify these entries are true and correct:
(TOTAL MILES DRIVING TODAY)
(NAME OF CARRIER OR CARRIERS)
(NAME OF CO-DRIVER)
(MAIN OFFICE ADDRESS)

MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11
Total Hours
1: OFF DUTY
2: SLEEPER BERTH
3: DRIVING
4: ON DUTY (Not Driving)
REMARKS

ANSWER SHEET -- UNIT 8-1

Barber

1. $104.70
2. $35
3. $4.03
4. $7.84
5. 9.5
6. $238.15
7. 55.38
8. $13.11
9. $2.52
10. $21.51

- - - - - - - - - - - - -

11. $5.23
12. 1.7
13. $8.50
14. $ .39
15. .1
16. $158.40
17. .60
18. .2
19. 2
20. $6
21. $54
22. 264
23. $45
24. $990
25. $11,880
26. $6
27. $132
28. $1,584
29. $10,296

ANSWER SHEET -- UNIT 8-2

Beautician-Cosmetologist

1. $192
2. $42
3. $21
4. $108.50
5. $260
6. $90
7. $40.50
8. $153.25
9. $239 base pay of $90
10. $59
11. $29.50 commission
12. $140.50 total (salary plus tips)
13. $134.50 or ($260 - $125.50)
14. $119.50 or [$239 - ($90 + $29.50)]

ANSWER SHEET -- UNIT 8-3

Child Care

1. 5
2. 15
3. Once a month
4. 1575
5. 79
6. 3
7. 3
8. 3375
9. 67 1/2

Schedule:

25 minutes

25

40

30

25

20

30

25

30

25

50

35

45

30

30

20

15

52

ANSWER SHEET -- UNIT 8-4

Stewardess

1. a. 2049
b. 0040
c. 1205
d. 0405
e. 1130
f. 0105
g. 2320
h. 1840
i. 2020
j. 0030

2. a. 12:49 a.m.
b. 12:30 p.m.
c. 8:20 p.m.
d. 11:30 a.m.
e. 5:45 p.m.
f. 9:32 p.m.
g. 4:08 a.m.
h. 6:21 p.m.
i. 12:05 a.m.
j. 1:49 a.m.

3. a. 1500
b. 1709
c. 1509
d. 1349
e. 0105
f. 2000
g. 2030
h. 1305
i. 0600
j. 1430

4. a. 2 hours 35 minutes
b. 2 hours 35 minutes
c. 2 hours 51 minutes
d. 4 hours 45 minutes
e. 5 hours 45 minutes
f. 7 hours 57 minutes
g. 1 hour 45 minutes
h. 0 hours 55 minutes

ANSWER SHEET -- UNIT 8-5

Interior Decorator

1. 58 3/4
2. 66 1/2
3. 55 3/4
4. 42 1/2
5. 224
6. 420
7. 148.125
8. 170.2
9. $125.30
10. $808.65
11. 4.73
12. 3.17
13. 29.63
14. 24

- - - - - - - - - - - - -

15. 254
16. To change square inches to square feet
17. 8
18. $79.60
19. 232
20. 7 1/2
21. $78.75
22. $158.35
23. $100.75
24. $263.85
25. 348
26. 38.7
27. $455.33
28. $106.94
29. $121.42
30. $16.87
31. $700.56
32. 136 inches
33. 84 inches
34. 18 inches
35. 9 1/2 feet
36. 313 inches
37. 193 inches
38. 8
39. 5
40. 6
41. 4
42. 123.5
43. 41.2
44. $597.40
45. $82.40
46. $91
47. $20.39
48. $791.19
49. $1,755.60

ANSWER SHEET -- UNIT 9-1

Radio Announcer

1. 9 minutes 42 seconds
2. 64 minutes 9 seconds
3. 12 minutes 23 seconds
4. 26 minutes 41 seconds
5. 4 minutes 39 seconds
6. 1 minute 18 seconds
7. 49 minutes 59 seconds
8. 1 minute 14 seconds
9. a. $28.50
    b. $80
    c. $234
    d. $342.50
10. a. $338
    b. $161.50
    c. $300
    d. $95
    e. $894.50

- - - - - - - - - - - - -

11. 10
12. 16 1/2 minutes
13. 5
14. 13:45
15. 50"
16. 14:35
17. 1:55
18. $130
19. $13
20. $3
21. $975
22. $15
23. $90
24. $96
25. $2,600

ANSWER SHEET -- UNIT 9-2

Cameraman and Photography

1. 298
2. 37.75
3. 4289
4. 1/8
5. 15/128
6. 4/9
7. 3/4
8. 2 3/4
9. 2.5
10. 3/8
11. 8.88
12. 11.45
13. .9 feet
14. 1/4
15. 1/16

ANSWER SHEET -- UNIT 9-3

Musicians

1. 3/2
2. 4/3
3. 5/4
4. The numerator and denominator of each increase by 1
5. As the separations decrease, the ratio increases
6. 3 beats/measure; quarter note gets 1 beat
7. 4 beats/measure; quarter note gets 1 beat
8. 2 beats/measure; quarter note gets 1 beat
9. 5 beats/measure; eighth note gets 1 beat
10. 7 beats/measure; eighth note gets 1 beat
11. 12 beats/measure; eighth note gets 1 beat
12. Three 64th notes; 2 quarter notes (or any combination totaling 2 3/64 beats)
13. Any combination totaling 3 1/32 beats
14. The whole note shown accounts for all the beats in the measure
15. Any combination equaling 1 13/64 beats
16. Any combination equaling 9 1/32 beats
17. 180
18. 90
19. 60 beats per minute
20. 4/4 = 4 quarter notes
21. 24
22. 8
23. 5
24. 36

ANSWER SHEET -- UNIT 9-4

Small Bands

1. $30.87
2. $ .005
3. $30.87 } Answers may be
4. $30.88 } changed around.
5. a. $40
   b. $40
   c. $80
   d. $60
6. a. $62.50
   b. $62.50
   c. $125
   d. $93.75
7. a. 3 hours 45 minutes
   b. $25
   c. $18.75
8. a. $360
   b. $60
   c. $300
   d. $36
   e. $72
   f. $54
   g. $162
   h. $168
   i. $330
   j. $30
   k. $79.50
   l. $61.50
9. 14,400
10. 14,400
11. 960
12. 960
13. 16
14. 0
15. 48 minutes 0 seconds
16. 128 minutes 0 seconds
17. 64 minutes 0 seconds
18. 85 minutes 20 seconds
19. 32 minutes 0 seconds

ANSWER SHEET -- UNIT 9-5

Artist -- Commercial and Regular

1. 266
2. 468
3. $223.13
4. 27
5. 8.75
6. 31.2
7. 6.741
8. 17.5
9. 31.5
10. 864
11. 80
12. 32
13. 1 1/4
14. 12
15. 25
16. 28 1/8 or 28.125

- - - - - - - - - - - -

17. a. 4
    b. 4
18. a. 7.5" x 10.5"
    b. 8.35" x 11.69"
    c. 10" x 14"
19. a. 8
    b. 12
    c. No
20. a. 7" x 8 3/4"
    b. 16.6" x 23.24"
    c. 10.5" x 11.8"
    d. 26.6" x 33.3"
21. 1 1/3
22. 2"
23. 3 9/17" or 3.53
24. 4"
25. 75 square feet
26. 196 square feet

ANSWER SHEET -- UNIT 10-1

Mailman

1. B
2. C
3. D
4. D
5. E
6. A
7. C
8. A
9. B
10. D
11. D
12. B
13. A

- - - - - - - - - - - - -

14. 3.75
15. 333 1/3
16. $ .56
17. $5.48
18. $1.15 (.85 fourth class, .30 insurance)
19. $ .56 (air mail .22, books .34)
20. $ .46 (2 ounces first class .16, certified mail .30)

ANSWER SHEET -- UNIT 10-2

Policeman

1. 12 1/2 hours
2. a. 450 miles
   b. 22,500 miles
3. 2.856
4. 598.73
5. 1 to 500
6. a. 267
   b. 1 to 1,498
7. 1,500; 500 per shift
8. a. 42 blocks
   b. 3 1/2 miles
   c. 10 minutes
9. 33 blocks

ANSWER SHEET -- UNIT 10-3

Air Traffic Control

1. a. 5 hours 48 minutes
   - b. 1 hour 44 minutes 40 seconds
   - c. 1 hour 8 minutes
   - d. 1 hour 17 minutes
   - e. 17 hours 21 minutes 4 seconds
   - f. 00:08
   - g. 03:39
2. a. (1) 6,000 feet
      - (2) 10,000 feet
      - (3) 15,000 feet
   - b. (1) 300 miles
      - (2) 150 miles
      - (3) 50 miles
      - (4) 5 miles
   - c. (1) 740 feet
      - (2) 72,240 feet
      - (3) 63,360 feet
3. 1/12
4. 1/12
5. 16.6 miles
6. 10,000
7. a. 12,400
   - b. 33 1/3 miles
   - c. 285.04
   - d. 301/264
   - e. 1.14
8. a. 8500 feet
   - b. 25.5 miles
   - c. (1) 940 miles
      - (2) 570
      - (3) 1.65
9. a. 24,000 feet
   - b. 1520
   - c. 593
   - d. 2.56

ANSWER SHEET -- UNIT 10-4

Recreation and Parks

1. $6,500
2. $1,500
3. $4,800
4. $30,510 total recreation salaries
5. $120
6. $875
7. $1,200
8. $150
9. $375
10. $300
11. $200
12. $150
13. $5,845 total professional salaries
14. $7,540 total expenses
15. $43,895 total recreation budget
16. $10,044
17. $8,196
18. $8,076
19. $33,741 total park salaries
20. $9,650 total
21. $13,640 capital outlay
22. $57,031 grand park total
23. $13,940 total dutch elm
24. $8,160 total band fund
25. $100,926 park and recreation total
26. $123,026 total park and recreation, dutch elm, and band fund

ANSWER SHEET -- UNIT 10-5

Forestry Technician

1. a. 7 inches
   b. 153.86
   c. 153.86
   d. 1.07
2. a. 283.39
   b. 1.97
3. a. 13.69
   b. 6.85
   c. 147.34
   d. 1.023
4. 1.09
5. 3.69
6. .76
7. 5.76
8. .70
9. 3.10
10. 7.88
11. 6.60
12. 29.58
13. Plant more trees

ANSWER SHEET -- UNIT 11-1

Lineman

1. 89 5/8
2. 99 2/3
3. 18
4. 9 1/8
5. 620 feet or 206 2/3 yards
6. 479 feet or 159 2/3 yards
7. $7.056 or $7.06
8. W = 32
9. 549.70
10. 28.5
11. $2.70
12. 99 percent reductions; 99.13 %
13. 231 yards
14. 6.3 feet of 6.25 feet
15. 509.25 feet or 169 3/4 yards
16. $167.78
17. $12,022.40
18. $8,724.56

ANSWER SHEET -- UNIT 11-2

Telephone Repairman

1. 57
2. $228.16
3. 267
4. 442
5. 8 6/7
6. 5 5/7
7. $39.68
8. $7.44
9. $9.92
10. $6.4325
11. 31.68
12. 57.34
13. 400
14. 7
15. 56
16. 6/7
17. 3/7
18. 9/7
19. 1
20. 10/7
21. 9/7
22. 8/7
23. 6/7
24. 5/7
25. 40 units
26. 5 5/7
27. 18
28. 2 4/7
29. 30
30. 4 2/7
31. $7.44
32. $9.92
33. $198.40
34. $29.76
35. $228.16
36. $198.40
37. $66.96
38. $29.76
39. $295.12

ANSWER SHEET -- UNIT 12-1

Warehouse and Stocking

1. 72,880

- - - - - - - - - - - - -

2. a. 44,740
   b. 60,588
   c. 470
3. a. 27,280
   b. 1,470
   c. 2,133
4. a. 11,520
   b. 2,880
   c. 1,819
5. a. .78
   b. .79
   c. 1.8

- - - - - - - - - - - - -

6. 1/2
7. 1/3
8. 320
9. 280
10. 300
11. 440
12. 160
13. 1,500 feet, 1,000 board feet
14. 1,800 pounds
15. 46,000 pounds
16. 2,760 pounds
17. 3,000 pounds
18. 2,880 pounds
19. 2,940 pounds
20. 2,900 pounds
21. 2,840 pounds
22. 2,880 pounds
23. 58,000 pounds
24. No
25. 12,000 pounds
26. Yes
27. No
28. 21.9 pounds
29. 18.8 pounds
30. 18.8 pounds

ANSWER SHEET -- UNIT 12-2

Inventory Control

1. 190
2. 786
3. 131
4. 312
5. 173
6. 4,266
7. 116
8. 552
9. 13,733
10. a. 125
    b. 59
    c. 53
    d. 25
    e. 262
11. 2,223
12. 3,840 square feet
13. 40 conversion factor
    2,920 square feet
14. 45 conversion factor
    765 square feet
15. 48 conversion factor
    3,840 square feet
16. 2.000
17. 51.592
18. .867
19. .010

ANSWER SHEET -- UNIT 12-2

20.

Number pieces	Dimension	Description	Conversion factor	Per 1000 footage	Cost per 1000	Price
120	4'x8'	½" AC exterior plycore	32	3,840	120.00	460.80
80	4'x8'	5/8" CD sheathing	32	2560	125.00	320.00
17	4'x8'	¼" Prefinished v-grooved oak	32	.544	300.00	163.20
26	4'x12'	½" Sheetrock	48	1.248	50.00	62.40
20	48"x96"	3/8" Sheetrock	32	.640	45.00	28.80
					Total invoice amount	1035.20

21. To calculate new average costs as material comes in

22.

DD 129

DISBURSEMENTS & RECEIPTS

'71	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND
1-7	21826		120	286	6-4	22917		120	636										
1-10	21913		60	226	6-7	23007		120	516										
1-14	1756	240		466	6-21	23041		240	276										
1-20	21971		20	446	6-24	23103		222	54										
1-22	21981		80	366	6-25	1860	1200		1254										
2-7	21999		61	305	7-4	24001		240	1014										
2-14	22017		120	185	7-10	24111		480	534										
2-24	22111		20	165	7-12	24141		17	517										
3-4	22146		10	155	7-19	24161		69	448										
3-11	22152		60	95	7-22	24257		144	304										
3-19	22163		13	82	7-23	24264		23	281										
4-2	1802	240		322	7-23	24265		120	161										
4-6	22418		80	242	7-25	24280		120	41										
4-15	22500		70	172	8-2	1901	600		641										
4-25	22610		120	52															
5-12	1821	600		652															
5-12	22718		240	412															
5-13	22719		240	172															
5-24	22811		16	156															
6-3	1843	600		756															

DESCRIPTION

MINIMUM

MAXIMUM

SHORT NUMBER	ARTICLE	ORDERED	SHIPPED		SECTION	AISLE	LONG BIN
	4'x8'x½" AC Exterior Plycore						

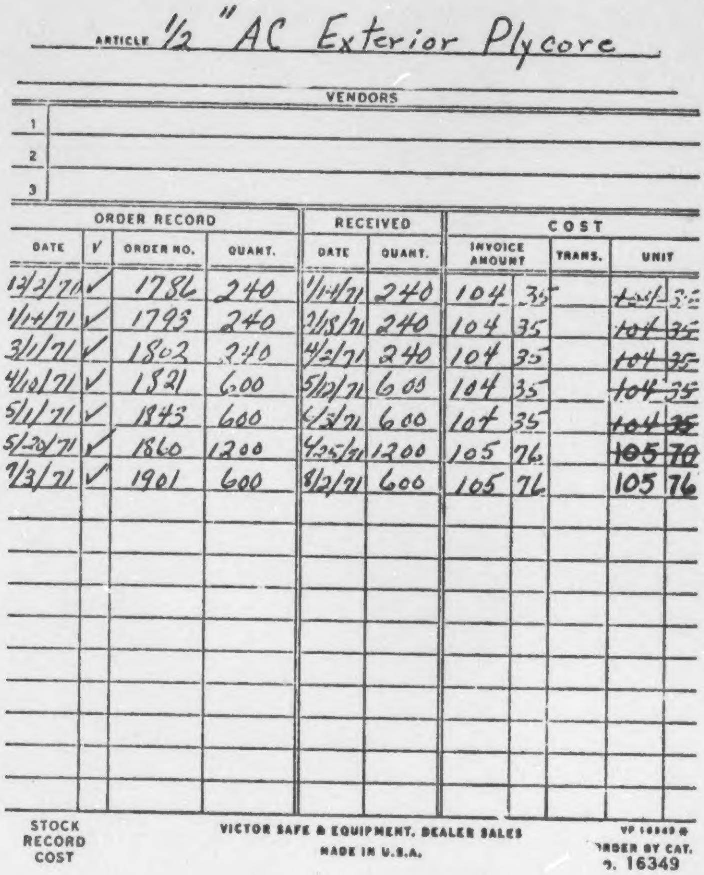
ANSWER SHEET -- UNIT 12-2

23. 54 pieces

24. 3,520

25. $192

26.



ARTICLE 1/2 "AC Exterior Plycore

VENDORS

1

2

3

ORDER RECORD				RECEIVED		COST				
DATE	√	ORDER NO.	QUANT.	DATE	QUANT.	INVOICE AMOUNT		TRANS.	UNIT	
12/2/70	✓	1786	240	1/14/71	240	104	35		~~104~~	~~35~~
1/14/71	✓	1795	240	2/15/71	240	104	35		~~104~~	~~35~~
3/1/71	✓	1802	240	4/2/71	240	104	35		~~104~~	~~35~~
4/10/71	✓	1821	600	5/12/71	600	104	35		~~104~~	~~35~~
5/1/71	✓	1843	600	6/3/71	600	104	35		~~104~~	~~35~~
5/20/71	✓	1860	1200	4/25/71	1200	105	76		~~105~~	~~76~~
7/3/71	✓	1901	600	8/2/71	600	105	76		105	76

STOCK
RECORD
COST

VICTOR SAFE & EQUIPMENT, DEALER SALES
MADE IN U.S.A.

VP 16349 ®
RDER BY CAT.
16349

ANSWER SHEET -- UNIT 12-2

27.

½" AC Exterior Plycore

ARTICLE

NP 1375 REMINGTON RAND

VENDORS

1

2

3

4

MONTHLY SALES

	1969	1970	1971	19	19	19	19
JAN	198	210	280				
FEB	167	175	201				
MAR	99	120	83				
APR	205	312	270				
MAY	776	800	496				
JUNE	683	560	702				
JULY	1422	1181	1213				
AUG	596	570					
SEPT	781	910					
OCT	310	245					
NOV	480	520					
DEC	114	150					
TOTAL	5831	5753					

MEMO:

CAT. NO. 1-8218 PRINTED IN U. S. A.

28. Approximately 800 or 900

29. Yes, there should be according to the previous two year's consumption.

30. These answers are on the chart for number 27.

ANSWER SHEET -- UNIT 13-1

Printing

1. 9,956 CC

2. 175 C

3. 8,450 C

4. 13.25"

5. 24.75

6. 359.5 hours

7. 16,000

8. 1,807.4 sheets

9. 250

- - - - - - - - - - - - -

10. a. 2

    b. 3

11. 720

12. 1/72

13. a. 2

    b. 1

    c. 3

14. 6

15. 21 picas by 12 picas

16. 12

17. 7.5

18. 5

19. 60

20. 2

21. a. 12
    b. 1 + 2 packages
    c. No

22.	28" x 42"	148	198	24
23.	35" x 45"	198	266	332

24. Circle choice a.

ANSWER SHEET -- UNIT 14-1

Personal Finances

1. $720
2. 11.1 percent
3. 5.6 percent
4. 25.5 percent
5. 5 percent
6. 24.4 percent
7. 6.9 percent
8. 5.6 percent
9. 0
10. 6.9 percent
11. $655.49
12. 91 percent
13. a. $64.51

    b. 8.9 percent
14. a. 4.76 months

    b. 5 months
15. $15.50
16. $325.50

ANSWER SHEET -- UNIT 14-2

Selecting a Home

1. $1,000
2. $250
3. $420
4. $180
5. $100
6. $300
7. $720
8. $250
9. 34.7 percent
10. $36.69
11. $46.69
12. $250
13. $203.31
14. $4,375
15. $7,500
16. $175
17. $300
18. $4,550
19. $7,800
20. $450
21. $250
22. $700
23. $175
24. $875
25. $450
26. $500
27. $780
28. $1,730
29. $239
30. $1,969
31. $450
32. $500
33. $980
34. $1,930
35. $249
36. $2,179
37. $450
38. $500
39. $2,000
40. $2,950
41. $300
42. $3,250
43. $540
44. $45
45. $710
46. $59.17
47. $670
48. $55.83
49. $1,008
50. $84
51. $45
52. $158.31
53. $59.17
54. $144.14
55. $55.83
56. $147.48
57. $84
58. $119.31
59. $144.14
60. $18,600
61. $5,300
62. $147.48
63. $19,100
64. $5,800
65. $119.31
66. $15,400
67. $14,600
68. $183.60

ANSWER SHEET -- UNIT 14-3

Food Purchasing

1. 4
2. 6 cups
3. 4 cups
4. 2 cups
5. 4 T and 4 tsp.
   or
   5 T and 1 tsp.
6. 1/2 tsp.
7. 1/4 tsp.
8. 1 tsp.
9. 2 cups
10. 7 1/2 pounds
11. 2
12. $2.18
13. 2
14. 57 cents
15. 1
16. 1
17. The quart for 53 cents
18. 12 1/2 cents
19. 7.9 cents
20. 22 ounce
21. $1.17
22. 16 cups
23. 8
24. 1
25. $1.29
26. 32
27. 30
28. $2.36
29. $12.06
30. 7 1/2
31. 1 7/8 or 2

ANSWER SHEET -- UNIT 14-4

Clothing Construction

1. $10.25
2. $9.99
3. $12.75
4. $10.50
5. $ .78
6. $22.06
7. $16.81

ANSWER SHEET -- UNIT 14-5

Buying and Caring for a Car

1. $420
2. $105
3. $720
4. 28%-30% acceptable; 28.6%
5. $92-$93 acceptable; $92.30
6. $90
7. $83.07
8. $173.07
9. $346.14
10. $28.85
11. 14,400
12. 8,640
13. 17
14. 15
15. 1,200 ÷ 15 = 80 gallons per month
16. 720 ÷ 13 = 55 gallons per month
17. 6 months
18. 33 cents
19. $26.40
20. $18.15
21. $44.55
22. $175.89
23. $ 88.39

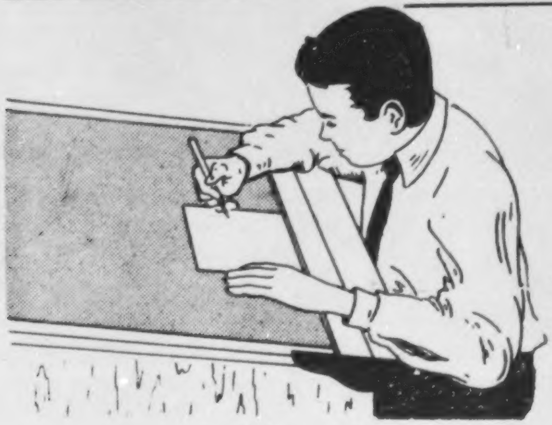
ANSWER SHEET -- UNIT 14-6

Computing Take-home Pay

1.-57.

	WEEK ENDED	HOURS							Regular Time	Over-Time	RATE			Regular Wages		Overtime Wages		Total Wages
		SUN.	MON	TUE.	WED	THU.	FRI	SAT.			Amount		Per.					
1	7/10	(1-	8	11	8	8	8		40	3								
2	7/17	10)	7 1/2	9	8 3/4	8 1/4	8 1/2		40	2								
							Total:		80	5	3	25		260	00	24	38	284.38
1	7/10	(11-	8	8 1/2	8	7	8 1/4		39 3/4	—								
2	7/17	20)	8 3/4	8 1/4	7 1/2	6 1/2	8		39	—								
							Total:		78 3/4	—	4	05		318	94	—		318.94
1	7/10	(21-	8 1/4	8 1/2	8 1/4	8 1/2	8 1/4		40	1 3/4								
2	7/17	30)	11	8 1/4	10 1/4	8 1/4	8 1/4		40	6 1/4								
							Total:		80	8	3	75		300	00	45	00	345.00

Maureen Libersanski	Ralph Szylinski	Thomas Smith
58. 284.38	71. 318.94	83. 345
59. 284.38	72. 318.94	84. 345
60. 14.79	73. 16.58	85. 17.94
61. 10.81	74. 12.12	86. 13.11
62. 45.30	75. 34.90	87. 58.90
63. 11.10	76. 11.70	88. 15
64. 1.71	77. 4.33	89. 1.71
65. .48	78. .54	90. .59
66. 2	79. 2	91. 15.75
67. 10	80. 6.87	92. 18.05
68. 14.19	81. 6.87	93. 18.05
69. 14.19	82. 236.77	94. 222
70. 188.19		



CAREER

RELATED

MATH

UNITS

CLUSTER INFORMATION

CAREER RELATED MATH UNITS
CLUSTER INFORMATION

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November 1971

Independent School District 281
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TO THE STUDENT

The materials in this book, along with the units in the career kit, will give you an idea of what kinds of things people do in their jobs. Careers or jobs that are related can be grouped together. When careers are grouped together we call the grouping a cluster. This book contains information about clusters of jobs. Read through some of the clusters found in this book and find one that interests you. Somewhere in the cluster information will be a list of career units for that cluster. Choose one of the career units to start with. Go to the career kit and find this unit and begin working on it. The units that are in the career kit will give you additional information about a particular career. The units will also give you a chance to see and work on the kinds of math problems that come up in that particular career. If you have questions about the career units or the math you need to know for that unit, ask your teacher for help.

LIST OF CAREER UNITS

I. Sales

1. Department Store Clerk
2. Service Station Attendant
3. Route Salesman
4. Auto Salesman
5. Cashier
6. Advertising

II. Insurance

1. Insurance Salesman and Adjuster

III. Construction

1. Carpenter
2. Electrician
3. Plumbing
4. Operating Engineer (Heavy Equipment)
5. Surveyor

IV. Medical and Health

1. Laboratory Assistant
2. Ward Secretary
3. Dental Assistant
4. X-ray Technician

V. Secretarial and Clerical

1. File Clerk
2. Typist
3. Auto Parts Counterman
4. Receptionist and PBX Operator

VI. Mechanical Occupations

1. Auto Mechanic
2. Small Appliance Repairs
3. Tool and Die Maker
4. Machinist

VII. Driving Occupations

1. Race Car Driver
2. Commercial Truck Driver

LIST OF CAREER UNITS

VIII. Personal Services

1. Barber
2. Beautician -- Cosmetologist
3. Child Care
4. Stewardess
5. Interior Decorator

IX. Performing Arts

1. Radio Announcer
2. Cameraman and Photography
3. Musicians
4. Small Bands
5. Artist -- Commercial and Regular

X. Government Jobs

1. Mailman
2. Policeman
3. Air Traffic Control
4. Recreation and Park
5. Forestry Technician

XI. Utilities

1. Lineman
2. Telephone Repairman

XII. Manufacturing and Supply

1. Warehouse and Stocking
2. Inventory Control

XIII. Printing and Publishing

1. Printing

XIV. Home Management

1. Personal Finances
2. Selecting a Home
3. Food Purchase
4. Clothing Construction
5. Buying and Caring for a Car
6. Computing Take-home Pay

CLUSTER ONE -- SALES

When looking at a future career, it is always important to look at the characteristics one possesses. A person's likes and dislikes, his interests and personality, etc., should be considered when planning the future. If someone is thinking of a career in sales, it may be even more important to do this, for the future of a person in this field depends so much on the kind of person he is. Success in selling comes to people who seem to have personal characteristics which allow them to succeed.

Most goods that we have contact with go through three steps. They are produced, they are distributed, and they are used or consumed in some way. The whole middle step, distribution is what sales is really involved with. Sales is a huge field with 4.6 million people involved with it in some way. In this field of work, individuals are employed to sell everything there is to sell in many different kinds of businesses and in every part of the country (or world). The level of training varies with the job, and the income received for selling also varies with the job. The work appeals to and uses people of all ages. It is an occupation that has openings for almost every kind of person.

The most familiar sales job involves receiving money from someone who has already selected a piece of goods, such as a cashier or store clerk does. Training for this position is usually given on the job. An ability to do math calculations, pay attention to detail, and follow instructions is important; but an employer is possibly even more concerned with other characteristics of the individual. These would include having an interest in people and being poised when meeting the public, as well as having a pleasant personality and a well-groomed appearance.

Other types of sales jobs require the seller to go out and make his own contacts with potential buyers. These people need to be able to work without someone pushing them to do the job. This requires self-discipline and self motivation. Customers seldom come to the salesman asking to have something sold to them. Some sales jobs require a great deal of training and a very thorough knowledge of the product to be sold, so that the seller can explain the product, tell or show how it works, and be convincing that the product is a good one. A computer salesman is an example of this kind of selling. His training may even involve some post-college education. Other jobs in selling may require on-the-job-training, a one or two-year training program at a technical, trade, or junior college or sometimes a four-year college degree.

The income received by sales people depends on many factors. A retail clerk, if just beginning a job, may earn $1.50 to $1.70 an hour, usually with regular advances in pay as experience is gained. Others may receive a regular salary plus commission, and their total pay is determined by the amount they sell. Some salesmen, such as the computer salesman mentioned above, may make only a few sales a year, but the sums of money involved are very large, and his salary and commission, if he receives one, are also large.

In the immediate future, to keep even with the number of salespeople now employed, 275,000 additional workers will be needed nation-wide. These 275,000 will only replace those who quit working or retire. Others, of course, will be needed to replace those who move to other kinds of work.

The one characteristic most important in the sales field would be the personality of the individual. There are no selling jobs that do not involve dealing with other people.

CLUSTER ONE -- SALES

A pleasant person, able to get along well with people, will find many opportunities in this line of employment.

The movement of goods and supplies so as to meet the wants of people will always be required. Goods will always be sold and likely will be sold in even greater quantities as the years go by. The future of a career in sales does, however, depend more on the state of the economy than most other jobs do. During periods of increased spending by the buying public, promotions and pay increases come rapidly, but a sales person is also likely to be one of the first people to feel a tightening or slow-down in the economy. This occurs because people spend less, resulting in smaller commissions and fewer people being hired.

Most areas of sales now have national organizations or associations to which you can write to get more specific information. These are listed in the Occupational Outlook Handbook under the specific titles of different sales jobs.

If you are interested in a sales job, work through one or all of the following units in the job kit:

1-1 Department Store Clerk
1-2 Service Station Attendant
1-3 Route Salesman
1-4 Auto Salesman
1-5 Cashier
1-6 Advertising

CLUSTER TWO -- INSURANCE

Just as there are many possible jobs available to someone in the area of sales, many possible positions are available in the area of insurance. From the clerical to the managerial to the sales job, much opportunity is waiting for the person interested in this area.

Just about all of us have some kind of insurance. Our lives, our health, our automobiles, our property are often 'covered' by some kind of insurance protection. Companies exist which will insure just about anything that you want them to. These companies generally divide into two categories -- those handling life insurance and those specializing in property and liability. Property and liability deals with protecting the property owned by an individual and the possibility of loss when one is held responsible for damage done to another or to his property. Life insurance pays at death, but also may insure a person from sickness, provide money for retirement, or pay if one is hurt while working. This kind of policy also provides a way to save money for future use.

The person most often seen by one contacting an insurance company is the salesman. He makes up a smaller part of the total force employed by the company than most think, however. The companies also employ large staffs of clerical people to type, check, file, bill, etc. Also employed are many actuaries, who determine the rates to be charged for the insurance. These rates are figured from tables prepared by other actuaries and mathematicians. Then underwriters determine the actual premiums paid by the policy owner. Companies often employ doctors; they have managers to help run the company; they need custodians to maintain the buildings, etc.

Once you feel that your insurance company should pay you for something that has happened, you file a claim -- a request that the company pay you some money.

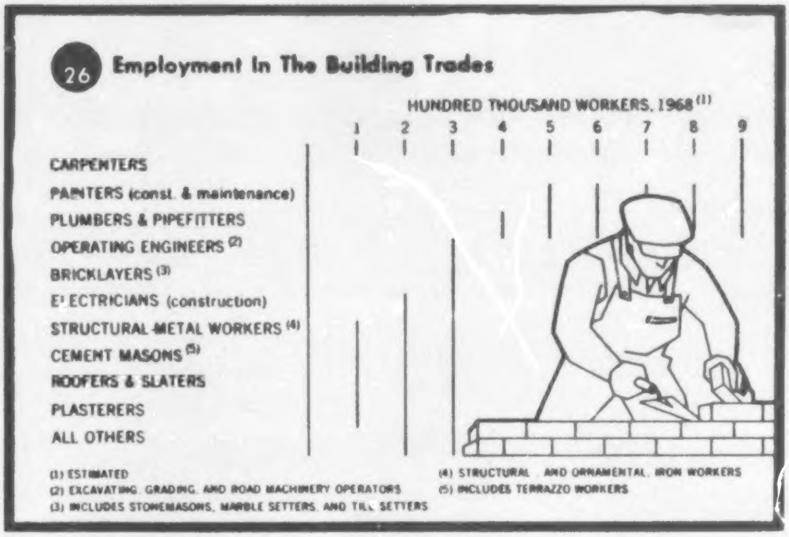
This claim is investigated by an adjuster and decisions made about payment. If you dent a fender on your car, your auto insurance will probably pay for much of the cost of getting it fixed. Your insurance agent will send out a claim adjuster to determine how much you should receive. A knowledge of costs and an ability to be fair is a must in this job.

About one third of all the people working in insurance are doing some kind of selling. The insurance salesman looks to a good future because as our economy grows and as people have more, they will be insuring more. The salesman does need to have some special qualities, however, to be successful. He must be able to show himself as trustworthy, for nobody would buy from a company that one could not trust. He also must be able to figure rates and answer questions about the policy and the company itself. He needs patience -- a willingness to explain and to answer questions, for insurance is complicated and few would buy if they didn't understand the policy. Of course, the other general attributes that all salesmen need apply to insurance sales, also.

Insurance provides much that is not obvious at first glance. It is a larger industry than most think, with total assets of close to 200 billion dollars and a total work force of nearly 1.3 million workers. It prefers to be called a service industry, for it uses its vast sums of available money for investment purposes that help all of us. The buying of bonds, investments in government and in other companies, and studies and research conducted by insurance companies help everyone, whether or not they own a specific policy.

If insurance is a field that interests you, choose to work through Unit 2-1. This unit will give you more information and some math problems that might be related to work as an insurance salesman or claim adjuster.

The following graph shows the number of people working in some of the building trades:



26 Employment In The Building Trades

(1) ESTIMATED
(2) EXCAVATING, GRADING, AND ROAD MACHINERY OPERATORS
(3) INCLUDES STONEMASONS, MARBLE SETTERS, AND TILE SETTERS
(4) STRUCTURAL AND ORNAMENTAL, IRON WORKERS
(5) INCLUDES TERRAZZO WORKERS

It is easy to see that these areas account for a great number of the skilled workers in our country. In fact, this industry employs more than 2 3/4 million skilled workers. Most of the people represented on the graph are journeymen. Journeymen are those skilled workers who have reached a designated level of training and experience. They have almost always successfully completed an apprenticeship program.

These workers are employed mainly by contractors who are the people responsible for the construction of a building. They (the contractors) hire the different tradesmen to do the work. Some of the journeymen work directly for the contractors and others are self-employed, working by the hour or the job for different contractors from week to week.

Most of the training which is required before a person can become a journeyman is acquired on the job. An apprentice is a learner who is working with an experienced tradesman. He has to work a certain number of hours supervised by this journeyman and he also must attend a certain number of evening school classes. This period of apprenticeship usually takes from two to five years. During the time a person is an apprentice, he receives a percentage of the pay the journeyman receives. He usually gets an increase every six months and the starting pay is often about 50 percent of the journeyman's pay. In addition some apprenticeship programs require that the apprentice take an exam before becoming licensed. These tests require a knowledge of the trade but also a knowledge of state and local regulations regarding the trade.

Current per hour pay (May 1971) for some different journeymen in the Twin Cities is as follows:

Asbestos worker	$7.55
Bricklayer	7.61
Carpenter	7.13
Dry wall applicators	7.13
Electrician	8.00
Floor coverers	7.65
Iron workers	7.55
Marble setters	7.38½
Operating engineers	8.00

When a journeyman looks at his future, he can see much good but also much uncertainty. Even with the economic growth of recent years, the growth of employment in this area will be moderate at best. The opportunity for movement to being a foreman, estimator, or even a contractor is good for the capable person, however.

Another problem is the seasonal nature of the work. Although most construction now can proceed the year around, winter months still bring about a drop in employment in these trades. One has to realize, of course, that even if a person does continue to be employed during the winter, the conditions under which he works may not be as pleasant as at other times of the year.

Construction workers are almost always members of a union, especially in the urban areas. A journeyman will pay $6 to $12 per month in dues to his union, and in return for this, the union provides certain benefits and will do the bargaining which establishes wages.

All in all, many opportunities in many diverse kinds of work exist for the individual who enjoys working with his hands in a physically active kind of job. The following are those construction jobs which are included in the packets of units. Feel free to pick those that you would like to work with and don't hesitate to investigate others that you might be curious about.

3-1 Carpenter
3-2 Electrician
3-3 Plumbing
3-4 Operating Engineer (Heavy Equipment)
3-5 Surveyor

CLUSTER FOUR -- MEDICAL AND HEALTH

Doctors and nurses -- isn't that what we think of when we think of the medical and health field? Doctors and nurses do make up a large part of this cluster of jobs, but the many, many other job opportunities are often overlooked. The medical field includes at least 25 different jobs all directly related to health. When we add the many support areas (secretaries, clerks, custodians, etc.) we have a huge field much larger than the 3.5 million working most directly with health. Registered nurses alone total around 700,000.

All levels of training are represented in these different jobs. From some on-the-job training received by a nurses' aide to the many years of school required of the would-be doctor, all levels of schooling and income are available.

Four common health occupations are included in this packet of units: lab assistant (4-1), ward secretary (4-2), dental assistant (4-3), and x-ray technician (4-4), but many others should be investigated by the person who likes serving others in the medical field.

Let's look at the jobs available by taking Bill through his different contacts with health people following his motorcycle accident.

Most of the people who saw the accident didn't think Bill was hurt too badly. He had pulled out in front of a car which was turning -- but the driver of the car decided not to turn. When hit, Bill was thrown across the road and hit his head on something. He could later remember being told not to worry about the damage done to his cycle, and he remembered that when he tried to sit up he got very dizzy. The next thing Bill remembered, two attendants were carrying him to the waiting ambulance -- he felt self-conscious that so many people were paying so much attention to him. There was the ambulance driver, the attendant, and an intern (a man in his final training before becoming a doctor). The intern asked where it hurt most but didn't seem to be as concerned with the scratches on Bill's arm (which hurt most) as he did with the lump on the side of Bill's head. Bill lay patiently as he got his noisy ride to the hospital.

Again he was self-conscious when so many people started doing so much after the ambulance stopped at the emergency entrance of the hospital. A nurse came to get information from the intern; two people moved him from the stretcher to a cart, and he was wheeled down the hall past a switchboard operator who was just then sending the other ambulance to some other problem. He was placed in a room where a nurse cleaned the cuts on his arm, and later a doctor came in with Bill's father.

After Bill had answered some questions, he heard the doctor tell his dad that he'd be staying overnight for some tests and some x-rays. Bill wondered, as he was helped into a hospital gown, who would have to wash the sheets that he had gotten blood all over.

The trip to the x-ray department was almost fun. He again had someone pushing him down the corridor and new people took over when he got there. Some x-rays were taken of his head and workers in another department hooked up some wires and took some readings. He also had some blood taken at this stop. Bill decided that others still would be doing things with these x-rays and other tests and hoped they didn't mix his stuff up with someone else's. He finally got to a hospital room and again saw his dad. For the next couple of hours, he decided to just become acquainted with his new "home." The excitement of the last couple of hours had been enough.

Bill didn't get much of a chance to relax, however, because a nurse came in and checked him over and an aide explained how to use the "call," etc. Then an orderly came in to help Bill wash up for his evening meal. While eating, Bill realized that he had never thought of the fact that a hospital also has to prepare food for the patients.

That night, still a different group of people took over the work of running the hospital and Bill wondered how *he* would like working all night. That night wouldn't have been a good one to start out with because a storm hit and Bill woke up to much scurrying because the electricity had just gone out. It was surprising how fast the lights came back on and Bill was further surprised to hear from his dad that it had been out for a couple of hours at home. Upon investigation, Bill found that the hospital had used its own generators for quite awhile before outside current was again restored. Bill wondered who had done the work of getting things going when the electricity did go out and decided that a hospital without its own power source *would* really be in trouble.

By the next day, the tests had come back, the hospital pharmacy had provided some pills, Bill's head was clear, and the doctor decided that he could go home. Check-out took some time and while Bill's dad was clearing with the clerk, getting his computerized bill straightened out and an okay for him to leave, Bill made a list of the people he had had contact with while at the hospital for that one night:

The list included:

Ambulance driver
Ambulance attendant
Intern
Switchboard operator

CLUSTER FOUR -- MEDICAL AND HEALTH

Nurse
Orderlies
X-ray technicians
Lab technicians
Doctor
Pathologist
Radiologist
Station secretary
Nurse's aide
Practical nurse
Custodian
Elevator operator
Clerk
Computer operator
Pharmacist
Cook
Receptionist

As Bill left, he just knew that even with this long list, he had certainly left out many.

Four medical and health jobs are included in the units of this cluster:

4-1 Laboratory Assistant
4-2 Ward Secretary
4-3 Dental Assistant
4-4 X-ray Technician

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

If you are a girl, and you plan to enter the working world immediately following high school graduation, chances are high that you would be employed in some sort of clerical job. Statistics show that more than half of the girls going to work after high school take jobs in the clerical field. Seven out of 10 clerical workers are women, and of 13,000,000 clerical workers in the country, approximately 2,500,000 are employed as secretaries or stenographers.

In planning a career in this field, completion of high school is the first step, and the high school courses should include some subjects related to the field. Following this, it is desirable to enroll in a trade or business school for specialized training in the required skills. Good performance in these skills is necessary, because the results of clerical work are easy to check, and errors are obvious. Tests are available for screening the skills of an applicant with reference to typing, shorthand, filing, etc.

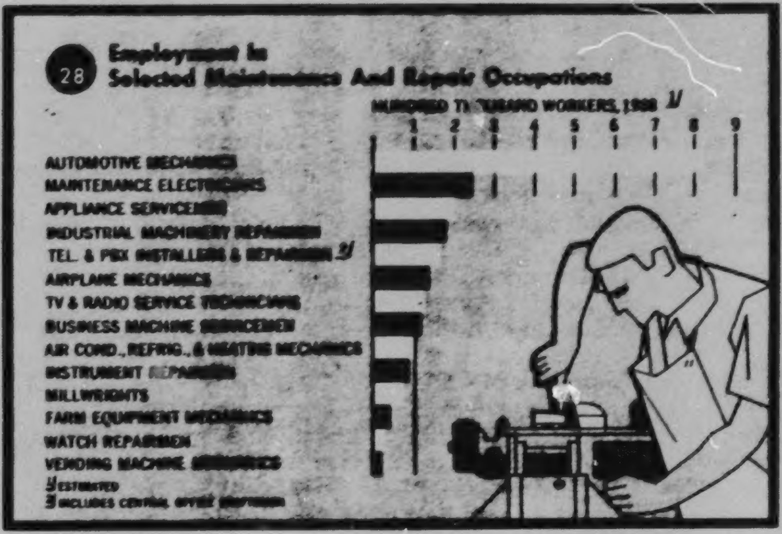
Adequate employment opportunity is available to the person who has the ability to do this sort of work well. One reason for this is that many young girls enter the field and work only a short time, perhaps quitting to marry, or raise a family and return to work later in life. These openings can then be filled by new employees in the field. Secondly, the field itself is expanding and there is an increased need for additional clerical workers.

Salaries in this job category are dependent upon many factors: training, ability, experience, etc. A starting position for a person with little or no training, beyond the basic skills required for the job, will result in lower pay than that of an individual who has more training and more varied skills. A topnotch executive secretary, who is required to assume a lot or responsibility, may receive a very high salary. Most salaries, however, range from $70 to $140 a week.

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

If secretarial or clerical work seems to be of interest to you, work through the units in this cluster area.

- 5-1 File Clerk
- 5-2 Typist
- 5-3 Auto Parts Counterman
- 5-4 Receptionist and PBX Operator



This chart gives you an idea of the size of the different mechanical occupations shown on it. Further specific information can be found in the Occupational Outlook Handbook.

In addition to the jobs listed on the chart, machining occupations make up a group totaling somewhat over a million. These occupations break themselves down into machine tool operators, machinists, layout men, tool and die makers and set-up men -- the people who make the many metal parts that either go into other machines or are used in a product of some kind.

The servicemen and mechanics shown on the chart do a greater variety of work and are not as often directly responsible for the building of a part; more often they deal with the repair of a product. The most current unior per-hour wages paid to journeymen workers in some of these fields are:

Airplane mechanic	$5.50
Auto mechanic	3.64
Machinist	4.09
Tool and Die Maker	4.09

CLUSTER SIX -- MECHANICAL OCCUPATIONS

It should be recognized that in some of these jobs as well as in others listed in this cluster, union membership may not be required in the same way that it is elsewhere. Pay scales for those not in the union may therefore differ greatly from what is listed here. The auto mechanic at a gas station in a smaller town will be paid what he and his boss can agree to.

Mechanical jobs make up areas of work that most people (especially boys) are interested in. The work is active and what is done can be easily seen. Because it looks interesting, many who are not well equipped for this work try it. A question that should be asked, therefore, is "Can I do this kind of work well?" Past mechanical success will give a clue to the answer to that question, but also one should look at ability as shown on the tests which can do a good job of measuring mechanical ability or aptitude. The counselor at your school can surely help you to further answer the question of whether or not you have what it takes to do work in the mechanical field.

Many also who feel an interest for this work don't like the related work that is often needed. A desire and ability to do blueprint reading, circuit reading, specification table reading, and technical instruction manual reading, along with mathematical computing and measurement reading, sometimes doesn't go along with the strict mechanical interest. These abilities, however, are often required as much as the ability to do the mechanical part of the job.

Look then to your interests as shown in hobbies, courses taken, books read, etc., and check your aptitude on tests available from your counselor to see if this is an area of interest and ability for you. If it is, and you want to look more specifically into this field, choose one or more of the specific job units and work through it. Those included in this cluster are:

CLUSTER SIX -- MECHANICAL OCCUPATIONS

6-1 Auto Mechanic

6-2 Small Appliance Repairs

6-3 Tool and Die Maker

6-4 Machinist

- More than 2.5 million employees were engaged in truck or bus driving in 1968.
- In 1968, about 16 million private motor trucks were registered.
- Government agencies operated another 860,000 trucks.
- One out of every 19 male workers is a driver or a delivery man.

These facts which have been taken from the Occupational Outlook Handbook might surprise some of you. Most do not realize that this area of work is so large.

Most also look upon this area in one of two ways. We either see this as an exciting way to travel and have fun or we see drivers as people not prepared for any "better" work. Both of these views are incorrect of course. A truck driver's job seldom allows him to be a "sightseer" even if he has the chance to travel great distances across the country. His job carries with it much responsibility and the driving itself is full-time work. The record keeping and log preparation require some knowledge and ability that we often don't associate with a truck driver. (See units 7-1 and 7-2.)

Most drivers belong to the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America (Inc.), "teamsters" for short. This union has obtained many provisions which the driver at one time didn't have. Wages, maximum time allowed for driving in given periods of time, paid vacations, pay for meals and lodging when away from home, are examples.

Race car driving is an area that is growing just as most areas are. Increased interest in all phases of racing, from the drag strip to the long distance race, will permit more people into this field than ever before. The number of people, however, who make their living as a race driver is still quite small and most drivers do the driving as a hobby and hold down other full-time jobs. If driving is your main area of interest it certainly would be wise for you to choose a possible full-time job which relates closely to this interest area.

The units included in the packet under driving occupations are:

7-1 Race Car Driver

7-2 Commercial Truck Driver

CLUSTER EIGHT -- PERSONAL SERVICES

The personal service units included in this cluster are:

8-1 Barber

8-2 Beautician -- Cosmetologist

8-3 Child Care

8-4 Stewardess

8-5 Interior Decorator

There are many other areas of work that could fit into this cluster. Some are placed elsewhere (Policeman 10-2) and others are small and not included. It should be noted that there are about 650,000 barbers and beauticians, close to 30,000 stewardesses, and 15,000 interior decorators.

The area of personal services includes those jobs which primarily do a helpful kind of work for someone else. Maids, bell boys, waiters, custodians, etc., would fall into this category. The Occupational Outlook Handbook divides these services providing people into the following areas: 1) Jobs related to food preparation and service. Into this catagory would fit the cooks, waitresses, bartenders, etc. 2) Jobs relating to building cleaning and servicing. Here we would find the custodians, maids, etc. 3) Private household workers work in homes doing various household tasks. 4) Protective service workers are the police and firemen, guards, etc. 5) Those who concern themselves with health care, grooming, and other miscellaneous services such as stewardesses, aids, -- even ski instructors. In all of these areas the sale of a service for another person is the item dealt with.

Many of the kinds of abilities and attributes necessary for success in this area of work are similar to those needed in sales. Ability and interest in working with people, being able to get along well with others, etc., are needed in the sale of services just as they are needed in the selling of a product.

CLUSTER EIGHT -- PERSONAL SERVICES

Such a broad and diverse area does not allow for discussion of specifics about preparation, pay, working conditions, etc., so one must look more completely into these areas in the materials available in the school.

CLUSTER NINE -- PERFORMING ARTS

All of us at one time or another have daydreamed ourselves into the role of a successful performer of some kind. Whether it was a movie star, a rock singer, a dancer, or band member, the glamour and excitement of this area of work has caused all of us to 'dream' a little. Daydreaming our way into this kind of work is much easier than getting into it in a real way.

How many of the over 14,000 actors and actresses can you name? How many of the 23,000 dancers and dance teachers are you familiar with? Do you know many of the 166,000 musicians in our country, and how about the 60,000 professional singers? Few of the many who are active in these areas really become famous and many, many more who would like to make it, never even get into the ranks of the performing arts. If there is an area where drive and determination coupled with talent and ability are musts, this is it!

The performing arts include those occupations where performance might be musical, dramatic, comedy -- but all involve the entertainment of other people. People, of course, are not entertained by something not done well and so a performing artist is constantly dependent upon audience opinion. For this reason, and because peoples' tastes and attitudes differ so much, a successful entertainer must be able to adapt to new audiences and localities and current happenings and audience mood, etc. A good performer might change material while 'on the stage' as he sees his audience react.

Seldom is the area of entertainment entered without much perseverance and hard work. The 'instant success' is an exception. Most begin in small ways hoping for an opportunity to show their abilities and talent. "Bit" parts, participation in backup groups (choruses, bands, dance groups), numerous try-outs, jobs doing other things in order to provide a living -- are often a part of an aspiring entertainer's life. Many who set their sights on the 'big time' give up along the way.

But what of the ones that do make it? These are the ones that we see ourselves like in our daydreams. These are the famous ones who have the huge incomes, who are known by all and who live in the glamorous world of success. Even these, however, find that not all is so great. The pressures of being able to remain successful only as the audience says that you are, of living constantly in the public eye, of working long and hard to keep up on all that is required for continued success, sometimes causes difficulty for many. Even the glamour of making movies or practicing a dance or musical numbers for hours turns to hard work.

One bit of advice should be given to any hopeful performer. It appears in most material written for someone thinking about going into this area of work. The advice is: "Think about using your area of talent or art as a hobby rather than as a profession." If one is good enough, it still would become his life work, but the approach of preparing oneself also for another area of work seems legitimate.

It seems, however, that with the increase in leisure time and a greater need on the part of the general public to be entertained, an accompanying need for more performers will occur. The demand for excellence will continue also, for quality in performance has become expected.

The specific units included in this cluster are:

9-1 Radio Announcer
9-2 Cameraman and Photography

CLUSTER NINE -- PERFORMING ARTS

9-3 Musicians

9-4 Small Bands

9-5 Artist -- Commercial and Regular

Your math teacher is one of almost 5 million workers in the field of education. This is the largest area of workers within the larger scope of government employees. Teachers are not commonly thought of as government employees, but because the schools are supported by state and local government, teachers are classified in this group. Well over 12 million people work for the national, state, or local government in some way. Over 7 million work in what we more commonly think of as government jobs. The policeman, the building inspector, the highway maintenance worker; all fall into the category of government employees, as well as all of our elected officials.

Approximately 3 million people work for the federal government in civilian jobs of some sort. Almost every type of job that is available in private enterprise is also found in government service; they employ lawyers, economists, conservationists, health workers, scientists, and skilled workers of all fields such as secretaries and technicians.

Most federal employment requires that one take a Civil Service Examination. This test is comprised of various parts that test the different skills required for a particular job. Some of the tests are written examinations, while for other positions the applicant is rated on training or experience. After an individual completes the test, he is ranked on the basis of how well he has done. When an opening occurs, the top three candidates are interviewed and one of them is finally selected.

According to the current Occupational Outlook Handbook, most federal employees receive benefits that compare favorably with private industry. Civil Service employees work a 40-hour week and have 13 days of vacation per year for the first three years which increases to 20 days per year after that time. They get 13 days of sick leave a year and have eight paid holidays. The salaries are based on a schedule with different levels (18) depending on experience, training, length of employment, etc. The starting annual salary varies from approximately $5,100 at Grade 4 to $14,500 at Grade 13. There are some workers in Grades 1 to 3 and 14 to 18, but the number is small.

State and local governments offer a similar range of opportunities for employment to that of the federal government, although on a smaller scale. It has already been stated that education comprises the largest group of state and local government employees. The next two largest areas of employment are in health and hospital work, and highway work. This highway activity employs civil engineers, surveyors, machinery operators, truck drivers, and laborers.

Current government publications indicate an increase in job opportunities due to the need for better public transportation systems, urban planning and renewal programs for cities, increased police protection, better measures for combating air and water pollution, and finding ways to use and preserve our natural resources.

The salaries and wage scales of state and local governments vary widely, depending on the locality and occupation. As a general rule, those employed in clerical and blue-collar jobs have earnings comparable to those in private industry, while those holding administrative or professional jobs have somewhat lower earnings than a similar job in private industry would provide.

The specific jobs included in this cluster that are in the category of government employment are:

10-1 Mailman

10-2 Policeman

CLUSTER TEN -- GOVERNMENT

10-3 Air Traffic Control

10-4 Recreation and Park

10-5 Forestry Technician

CLUSTER ELEVEN -- UTILITIES

The water we drink, the gas we heat our homes with, the sanitation system we use, the electricity that we consume -- all come from a utility company. Some of these companies or departments are public (owned by us), some are private. All however, are controlled to a great extent by public authorities. The governmental control is necessary because the product produced is used so extensively that its production must be in the public interest. An example of this is the telephone company.

Utilities employ people from almost all job areas. Much like the insurance industry or government agencies or the medical field, utilities employ people from engineers to managers and from skilled workers to clerical people.

Usually one does not prepare himself to go into work in a utility. Instead, he prepares himself for a specific kind of work and may end up working in this job cluster. Only two of the many occupations that fall into this cluster are presented in the Career Kit. They are:

11-1 Lineman

11-2 Telephone Repairman

CLUSTER TWELVE -- MANUFACTURING AND SUPPLY

"Manufacturing is the activity around which our nation's economy revolves. From factories flow the goods that have provided a standard of living unmatched elsewhere in the world. The products of the manufacturing industries range in complexity from a simple plastic toy to an intricate electronic computer, and in size from miniature electronic components to gigantic nuclear-powered aircraft carriers. Many diverse processes are carried out in manufacturing. Workers refine ores and petroleum, process foods and chemicals, print books and newspapers, spin and weave textiles, fabricate clothing and footwear, and produce the thousands of products needed for our personal and national benefit. Our society, as we know it today, could not have reached its present level of prosperity without the goods provided by the manufacturing industries."

This paragraph from the Occupational Outlook Handbook gives a good indication of the scope of this, the largest industry that there is. More than one out of every five people employed work in the area of manufacturing. That amounts to over 20 million, 5½ million of which are women. Most (2/3) of these workers are blue collar workers. A blue collar worker would be a skilled or semiskilled worker. Craftsmen, foremen, clerical workers, and various professional and technical workers make up the rest.

Much variety, of course, exists within this industry. It is therefore very wise for you to check into the specific job classification/that you are interested in. You will find some in this cluster, but also be sure to investigate other units in other clusters where there are jobs that could occur in manufacturing.

The two jobs included in this cluster are:

12-1 Warehouse and Stocking

12-2 Inventory Control

-- the linoleum on our floors
-- the license plates on our cars
-- the wrappings we buy food in
-- the circuits in our televisions
-- the pictures we take with our camera
-- the money we spend
-- the leather in our belts or watchbands
-- the drivers' license or credit cards you have
-- the wallpaper on the walls
-- the paper towels you use
-- the design on wall paneling

All of the above may involve the printing industry in some way. It is easy to see that newspapers and magazines are not the only things that this industry works with. Seldom do we stop to think of all the ways the printing industry affects us in addition to the magazines, books, and newspapers that we see each day.

The printing and publishing industry (more currently called graphic communications) is usually divided into four parts. The composition phase which involves putting together the material to later be produced, the photography or platemaking phase which takes the material and puts it into the form which can be reproduced (printed), and the distribution of the material itself. These four phases involve hundreds of different kinds of jobs with a like number of various skills required.

Few realize how large this industry really is and how fast it has grown in recent years. In Minnesota, especially, where printing is one of the top industries and more specifically in the Twin Cities, printing and its closely related areas are having a great impact each year. With the federal government saying that the printing industry has been one of the fastest growing of any in the last five years, and with a future that looks much the same, much opportunity awaits the person who has prepared himself well.

Some of the many and varied jobs available in this area of work are as follows:

Typesetters -- either by hand or by machine, set the type into position to be printed.

Proofreaders -- check the type for mistakes.

Electro- or stereo-typers -- make duplicate plates for printing.

Photoengravers -- take pictures of copy so it can be printed (usually charts and pictures are handled this way).

Pressmen -- run the machines that print the material.

Bookbinders -- put the printed material together, inserting pages, and adding a cover, etc.

The jobs listed above are some of the actual skilled positions in this field. Many other kinds of jobs exist. The reporter, the editor, the writer, etc., are all involved in the field. They need, of course, different skills and do more of the work of getting the material written or assembled so that the workers described above can do the work of printing it.

The skilled workers generally earn $4.64 to $6.72 in the Twin Cities. The union is an effective one and the apprenticeship program is used. Schools are available which can help start one on his way. In fact, 11 area vocational schools have programs in printing or its related areas. In addition, many private schools have excellent programs. The other workers in this industry are not so easy to be specific about. Artists, editors, cameramen, binders, etc., have varying incomes and varying requirements for entrance into their jobs.

Few would argue that this industry has a future as bright as any area one might investigate. More communication is going to occur, and its importance will increase. With increased communications, more printing and publishing will be required. New methods involving this industry are also bound to be introduced just as has happened in the past (printed circuits, wallboard, etc.). An area with much opportunity and a future open to many with even very different interests and abilities is this, the printing and publishing field.

It is not difficult, if you are interested, to find someone to talk with about this area of work. A shop teacher can help. Most communities have a newspaper and in addition some have a printing shop. If you would like, you can also write the following for additional information:

Printing Industries of America, Inc.
5223 River Road
Washington, D.C. 20016

If the printing industry interests you, work through unit 13-1 in the Career Kit.

CLUSTER FOURTEEN -- HOME MANAGEMENT

All of us, whether man or woman, married or single, will actually have two full-time jobs. The first, of course, will be the occupation which we work at and are paid for. We will be secretaries, plumbers, clerks, etc., but we also will all be managing homes. As husband or wife or even as a single guy or gal, much of what we do will revolve around our homes and the way we organize and manage that home. Time spent learning to live within our income, selecting a place to live, feeding or clothing ourselves, purchasing a car, etc. -- as much time and effort is often spent working with these areas as is spent in the occupation that we hold down for pay.

Many others work in jobs that fall directly into the area of home management. These people work as home economists, finance counselors, seamstresses or tailors, chefs and cooks, etc. They do for a living some of the things that many do as home managers.

Training in the area of home management (which all could benefit from) is available in many forms. From the sewing class in junior high through all home economics classes in high school to the units and mini-courses in other classes, these techniques equip us as better home managers. In addition, specific courses are available at many post high schools which specialize in home management programs. Examples of these would be cooking, child development, clothing, and real estate courses at our adult evening schools; baking, cooking, clothing related, food related, and fashion merchandising programs at the area vocational-technical schools; various apprenticeships in areas such as baking; college studies in home economics and home management, etc. All of these classes and programs are direct attempts to better prepare us for both the career of home manager as a wife or husband, father or mother, home owner or renter, and careers in an area of home management which serve as livelihoods.

CLUSTER FOURTEEN -- HOME MANAGEMENT

This cluster deals with the following six home management areas:

- Unit 1 -- Personal Finances
- Unit 2 -- Selecting a Home
- Unit 3 -- Food Purchase
- Unit 4 -- Clothing Construction
- Unit 5 -- Buying and Caring for a Car
- Unit 6 -- Computing Take-home Pay

Other topics which could easily fall into the area of home management could be:

- Chef or cook
- Credit buying
- Purchase of stocks and bonds
- Interior decoration
- Child growth and development
- Planning a marriage

These also involve various math abilities.

CLUSTER ONE -- SALES

UNIT 1

Department Store Clerk

Millie is a girl who has decided to go into the retail sales field. She wants to be a department store clerk. While checking into this kind of work, she found that over three-fifths of the 3,000,000 retail salespersons are women. She also found that starting salaries ranged from $1.50 to $1.70 an hour and that seemed to fit in with what her friends were earning in other jobs at this level.

She did find that there are some disadvantages in being a clerk. Week-end work and extra hours during the time before holidays didn't appeal too much to Millie. She discovered, however, that most clerks received a discount on products purchased, that most get a commission on what they sell, and that there seemed to be a good future for the person who does well.

Millie now went to the local newspaper and found the following ad:

> SALES
>
> We have several schedules for
> daytime and evening sales open-
> ings. No experience required,
> immediate openings. Apply
> Personnel Office.
> Dayton's Dep't. Store

Millie called and arranged an appointment for an interview. Upon her arrival she was asked questions about her educational background and any previous experience. Also, she had to take an employment test similar to the following. (Please take the following test; show all work on this paper. Check the results with your teacher before going any further.)

Pretest for Department Store Clerk

Add

1. $ 7.89
11.00
10.99

2. $ 1.29
.39
27.50
.79
1.09

Subtract

3. $10.00
- 7.97

4. $20.00
- 16.50

Multiply

5. $ 6.49
13

6. $17.87
6

7. 1/3 x $27.99

8. 25% of $24.50 is ________

9. A 20 percent discount on $37.50 = ________

10. Three items @ $3.27 is ________________

11. A good place to get additional information about specific jobs in the sales area would be:

a. A dictionary
b. The Occupational Outlook Handbook
c. A college catalog
d. An encyclopedia

12. The most likely starting pay that you would receive if you had no training in a sales job, would be:

a. $2.25 per hour
b. $1.50 per hour
c. $ .85 per hour
d. $1 per hour

Millie satisfactorily completed the interview and the pre-employment test and was conditionally hired. On her first day of employment, she was assigned to the bedding and linens department. There she was trained by the department supervisor. One of her first duties was to check the amount of cash on hand in the register. The register contained 1-$20, 3-$10, 6-$5, 15-$1, 10-$.25, 12-$.10, 25-$.05, 5-$.01. The total amount in the register was 13.________. Does this seem to be a reasonable amount of cash for making change?

Soon after the store opened, a customer approached Millie wishing to make some purchases. She bought a pair of pillow cases @ $2.39 each and a set of matching top and bottom sheets at $6.50 per sheet. The customer's bill for the goods came to 14.____________ and with three percent sales tax amounting to 15.__________, her total bill was 16.________________. She handed Millie two $10 bills and received 17.___________in change.

The following problems are similar to the one above. Be sure to add the three percent sales tax in computing the total cost.

Five additional problems involving items and sales tax:

18. 1 mattress pad, $10.28
    1 mattress and innerspring, $205.99
    2 pillows, $6.25 each
    2 pillow cases, 2 for $4.26
    Total cost________________

19. 6 sheets, 2 for $2.83
    1 bedspread, $34.89
    Total cost_______________

20. 1 bedspread -- twin size, $15.61

4 sheets @ $1.62

3 pillows @ $3.48

1 mattress pad, $6.52

Total cost ________________

21. 1 mattress cover, $8.17

4 pillow cases @ $2.14

Total cost ________________

22. 1 electric blanket, $14.65

3 sheets @ $2.34

2 pillows @ $6.49

1 mattress, $49.68

1 bedspread, $29.82

Total cost ________________

Three days after her initial employment the store held its annual January white sale. During this sale most of the items in Millie's department are marked from 10 percent to 50 percent off the regular price. A lady purchased a mattress regularly priced $69, now marked down one third from the regular cost. The sale price was 23.__________. She also purchased two pillows regularly priced $6.76, each now on sale at one fourth off the regular price. The sale price of the pillows was 24.__________. The lady's total purchases came to 25.__________ (be sure to add sales tax), a savings of 26.__________ from the presale price.

A sample receipt form from the above transaction is found on page 7.

Study it thoroughly and complete the following five problems using the blank receipt forms provided after page 15. Follow the same format used in the example to complete the following five problems. Check your work with your teacher.

Five problems dealing with sale items and using receipts: (Figure 3 percent sales tax.)

27. Bath towel set @ $12.69
33% discount

Bunk bed sheets (2 sets) $8.97 per set
50% discount

28. Mattress, $47
1/3 off

Pillows, 3 @ $6.97 each
15% off

Mattress pad, $11.32
20% off

29. Pillow covers, 2 @ $4.97 each
30% off

2 top sheets @ $8.50 each
25% off

2 fitted sheets @ $9.50 each (also 25% off)

30. 6 bath towels @ 2 for $2.22
33% off

1 dozen hand cloths @ 39¢ each
33% off

31. Pillow cases, 3 @ $1.79 each
25% off

Sheet sets, 2 @ $11.79 per set
25% off

Millie decided to purchase some items on sale. In addition to the sale discount she was eligible for a 10 percent employee's discount on the sale price. She purchased a bedspread regularly priced $17.89 on sale at 30% off the regular price. The sale price was 32.__________. She then deducted her 10 percent employee's discount from the sale price, which resulted in a price of 33.______ for the bedspread. She bought two pillows at a regular price of $6.76 each, now on sale at 1/4 off. Her cost for the pillows was 34._______. Her total cost (plus tax) was 35.__________. Because of the sale and her employee's discount, Millie saved 36.________.

Wages

By the end of the week, Millie collected her first paycheck which had been figured in the following manner:

40 hours @ $1.60/hour = 37.______________

8 hours overtime @ $2.40/hour = 38.______________

Total wages = 39.______________

Being part of the working force, Millie now had the chance to help support her country and her state, as well as prepare for her retirement. These deductions from her paycheck came to:

Federal Income Tax:	$10.18
State Income Tax:	$ 2.49
Social Security:	$ 5.18

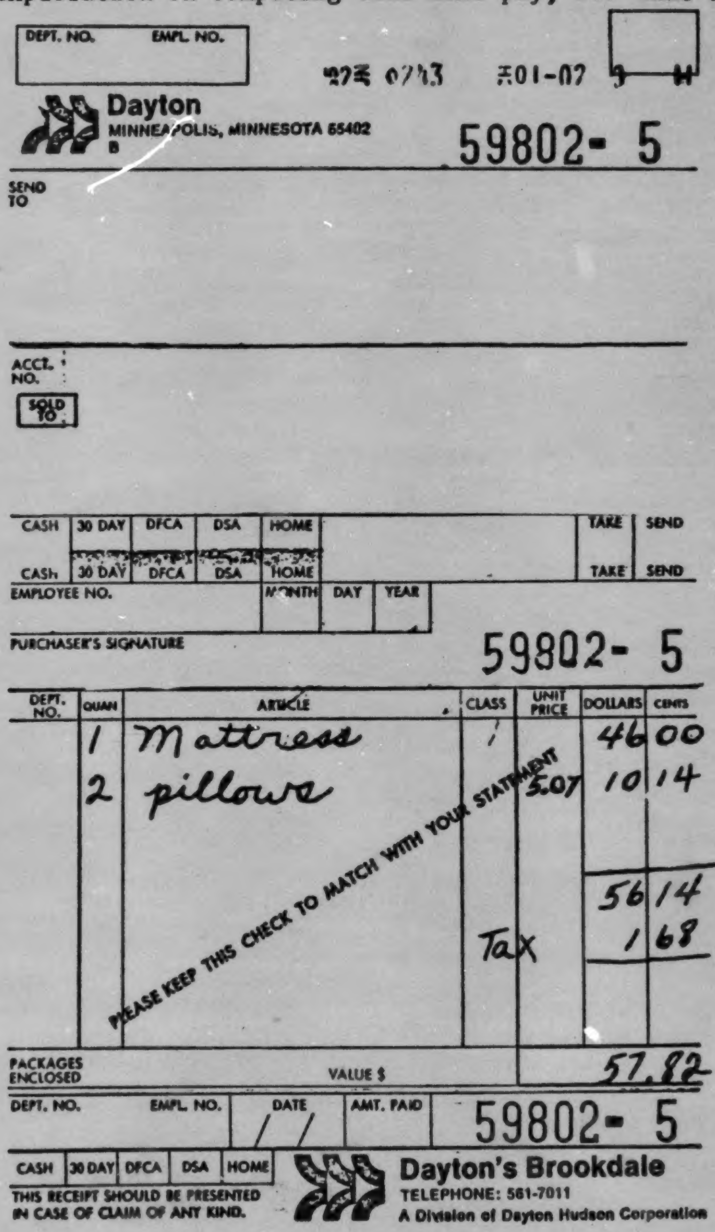
This resulted in total deductions of 40.______; her take-home pay then came to 41.__________.

For additional exploration on computing take-home pay, see unit 14-6.

SAMPLE

RECEIPT

FORM



DEPT. NO. EMPL. NO.

27 0743 01-07

Dayton
MINNEAPOLIS, MINNESOTA 55402
B

59802- 5

SEND TO

ACCT. NO.

SOLD TO

CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO. MONTH DAY YEAR

PURCHASER'S SIGNATURE

59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS
	1	Mattress	1		46	00
	2	pillows		5.07	10	14
					56	14
			Tax		1	68

PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATEMENT

PACKAGES ENCLOSED VALUE $ 57.82

DEPT. NO. EMPL. NO. DATE / / AMT. PAID

59802- 5

CASH	30 DAY	DFCA	DSA	HOME

THIS RECEIPT SHOULD BE PRESENTED IN CASE OF CLAIM OF ANY KIND.

Dayton's Brookdale
TELEPHONE: 561-7011
A Division of Dayton Hudson Corporation

CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO.	MONTH	DAY	YEAR

PURCHASER'S SIGNATURE

59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS
		PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATEMENT				

PACKAGES ENCLOSED VALUE $

DEPT. NO.	EMPL. NO.	DATE / /	AMT. PAID	59802- 5

Problem 27

Problem 28

CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO.	MONTH	DAY	YEAR

PURCHASER'S SIGNATURE

59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS
		PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATEMENT				

PACKAGES ENCLOSED VALUE $

DEPT. NO.	EMPL. NO.	DATE / /	AMT. PAID	59802- 5

CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO.	MONTH	DAY	YEAR

PURCHASER'S SIGNATURE 59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS
		PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATMENT				

PACKAGES ENCLOSED VALUE $

DEPT. NO.	EMPL. NO.	DATE / /	AMT. PAID	59802- 5

Problem 29

Problem 30

CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO.	MONTH	DAY	YEAR

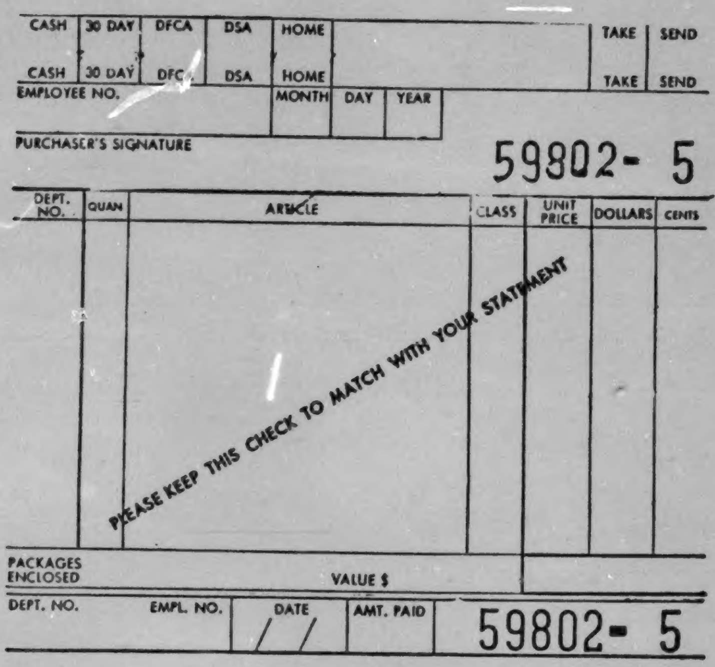
PURCHASER'S SIGNATURE 59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS
		PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATMENT				

PACKAGES ENCLOSED VALUE $

DEPT. NO.	EMPL. NO.	DATE / /	AMT. PAID	59802- 5

Problem 31



CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND
CASH	30 DAY	DFCA	DSA	HOME		TAKE	SEND

EMPLOYEE NO.	MONTH	DAY	YEAR

PURCHASER'S SIGNATURE

59802- 5

DEPT. NO.	QUAN	ARTICLE	CLASS	UNIT PRICE	DOLLARS	CENTS

PLEASE KEEP THIS CHECK TO MATCH WITH YOUR STATEMENT

PACKAGES ENCLOSED

VALUE $

DEPT. NO.	EMPL. NO.	DATE	AMT. PAID	
		/ /		59802- 5

CLUSTER ONE -- SALES

Unit 2

Service Station Attendant

Tom was out driving his Dad's car and stopped to get gas at an M-O dealer he spotted. He had been thinking about trying to buy his own car, just an old 1952 Chev that he could fix up enough to take him where he would want to go. But, that takes money, and that he didn't have; so, while he was making small talk with the attendant servicing his car, he noticed a sign in the window which read:

HELPED WANTED
FULL OR PART TIME
APPLY INSIDE

Tom decided to give it a try.

However, the manager didn't know Tom, and he had to learn whether Tom could handle the math involved. Even though a pretest isn't usually given for this type of job, the manager asked Tom to try the following problems:

Addition of dollars and cents

1.		2.		3.	
Lube	$2.50	STP	$1.09	Gas	$5.75
Oil	4.25	Gas cap	.79	1 quart of oil	.85
Filter	3.95	Fan belt	3.29	1 pint of auto transmission fluid	.45
		Wiper blade	2.50		

Subtraction in making change

4. Tendered $10.00
Bill 7.49

5. Tendered $8.00
Bill 7.19

6. Tendered $25.00
Bill 21.08

Multiplication when selling several items at same price

7. 4 qt. of oil @ 85 cents per qt. is __________

8. "SALE" -- STP @ 69 cents per can (Limit six per customer)

6 cans @ 69 cents is __________

9. 13.5 gal. gasoline @ 31.9 cents per gal. __________

10. 2 tires @ $31.49 each (excise tax included) __________

Check with your teacher before going on in the unit.

Tom handled the test well, so he was hired. Since the station was shorthanded at the moment, Tom started work immediately. The first car that drove up needed gas only. The pump showed 12.4 gallons at a cost of $4.33. In ringing this up on the cash register. Tom had to make change for a $10 bill.

The register didn't figure change, and Tom decided that to make change he should use the fewest possible coins and bills. Consequently, the customer's change would consist of:

11. ____pennies, ____nickels, ____dimes, ____quarters, _____$1, ____$5, and ____$1

What is the total change given? _______. Do the totals add up?

Give the correct change for the following:

Cost	Paid with	Change (In what denominations?)
$15.62	$20	12. ______________
$ 5.69	$ 6	13. ______________
$13.87	$15	14. ______________
$47.13	3 $20 travelers checks (Handle as 3 $20 bills.)	15. ______________
$34.76	$50	16. ______________

Tom's second customer wanted servicing done to his car. This involved oil change and filter, a lube job, having the tires rotated, and installing a trailer hitch.

Oil:	$ .85/quart
Lube:	$2.50 (labor and lubricant)
Transmission fluid:	$ .35/pint
Filter:	$3.95 (installed)
Tires rotated:	$2.50
Labor:	$9.50/hour

To service the customer's car required five quarts of oil, and one pint of transmission fluid. Installing the owner's trailer hitch required two hours' time.

What would his total bill be? Don't forget the sales tax (3 per cent) on the oil and filter. What would be the change from a $50 bill? 17.__________

These jobs are written up on a separate sales slip. In the back of this unit, you'll find the above job written up. Write up the following jobs in like manner. (Note: Include sales tax on all parts and commodities.)

18. Tire repair (flat) $2

Radiator hose $4.50 and 1/2 hour labor ($9.50/hour)

Total cost (plus sales tax) __________

19. Delivery of two gallons of gas to a stalled car on a freeway.

Gas 34.9/gallon Delivery charge $5 Total cost __________

20. Car hauled in 16 miles after blowout which wrecked the wheel (no spare in car.) Hauling fee $1/mile one way

Wheel $10.50

Tire $29.50 (Include excise tax of one percent.)

No installation charge Total cost __________

21. Four new tires; three at regular price of $28.90 and the other at one-half price. This package includes mounting only. Balancing the tires is $2/tire. What is the total cost if the customer wanted all four tires balanced? __________ (Include excise and sales taxes.)

22. Oil change: 5 qts. @ 85 cents/qt.

Filter: $3.95

Fan belt for air conditioner: $4

Recharge air conditioning unit: $14 labor plus Freon @ $2/lb.

Conditioner needs two pounds of Freon.

Total cost __________

Tom found that the station also sold bulk oil at 35 cents/quart. During the day he had to figure the cost on filling these different amounts.

	Number of qts.	Cost	Sales Tax	Total cost
23. 2 pints				
24. 3 quarts				
25. 1 5-gallon can				
26. 1 2-gallon can and 4-quart pail				
27. 1 55-gallon drum				

After Tom's first day on the job, he decided to check up a little on the job of being a station attendant. He went to the local library and found the Occupational Outlook Handbook. In it he discovered that he was one of more than 410,000 attendants who service more than 95 million motor vehicles in this country. He also discovered that there are almost 5,000 new openings each year in this work and felt content to know that the opportunities are present for the person interested and willing to work.

At the end of only one day's work, Tom could see both good and bad things about his new work. Although the weather was good that day, he could see more difficulties in the winter when it would be cold and snowy. He also liked the idea that his new boss had already asked him to work Saturday night, because it meant more money. But he saw some free weekend time and some evenings that would now be spent on the job.

Tom was also surprised to find so many more situations which required math. Many of these other math applications will be explored in the units of the mechanical section.

17.

CAR CARE SERVICE

No. 289729

LICENSE NO. ____

NEW CAR WARRANTY PLATE NO. ____

CAR MODEL AND MAKE ____

DATE ____

MILEAGE NEXT SERVICE DUE ____

NAME Ralph Jensen

ADDRESS 3145618 49th Ave

TIME WANTED ____

CITY Mpls. STATE MN

PICK UP ☐ DELIVER ☐

PHONE NUMBER 415-6728

CAR CARE SYSTEMS INSPECTION

☐ BRAKE ☐ VISIBILITY ☐ COOLING & FILTERING

☐ EXHAUST ☐ IGNITION ☐ RIDING & STEERING

REPAIR AND PARTS ORDER

QUANTITY	PART NO. OR DESCRIPTION	AMOUNT
Customized trailer hitch installed		
	2 hrs. labor @ 9.50	19.00
	TOTAL PARTS	
	TOTAL LABOR	19.00
	TOTAL	19.00

SERVICE AND PRODUCTS

✓	DESCRIPTION-QUANTITY-UNIT PRICE	AMOUNT
	GASOLINE ☐ ☐ ☐ PRIM. ☐	
	MOTOR OIL ☑ CHANGE SAE 10W-30W	
	BRAND Pennzoil 5 QTS @ .85	4.25
	OIL FILTER TYPE ____	3.95
	LUBRICATION ☑	2.50
	TRANSMISSION ☑ CHECK ☐ CHANGE 1 pint LBS @ .35	.35
	DIFFERENTIAL ☐ CHECK ☐ CHANGE ____ QTS LBS @ ____	
	WHEEL PACK ☐ UNIVERSAL JOINTS ☐	
	MANIFOLD HEAT RISER ☐ CHOKE LINKAGE ☐ LUBRICATE	
	PCV SERVICE ☐ CLEAN ☐ REPLACE TYPE	
	OIL FILLER CAP ☐ CLEAN ☐ REPLACE	
	AIR CLEANER ☐ CLEAN ☐ CHANGE TYPE ____	
	COOLING SYSTEM ☐ CHECK ☐ GRP ☐ CLEANER ☐ PROTECTOR ☐	
	☐ ATLAS PERMA-GUARD ☐ FROST GUARD ____ GAL. @ ____	

TIRES	L.F	R.F.	L.R.	R.R.	SPARE	AMOUNT
REPLACE						
ROTATE ☑						
REPAIR ☐						2.50
WHEEL BALANCE						

WHEEL ALIGNMENT ☐

BRAKES ☐ INSPECTED ☐ ADJUST ☐ FLUID ADDED ____

CAR APPEARANCE ☐ WASH ☐ POLISH ☐ WHITE WALLS

OTHER MAINTENANCE ENGINE TUNE-UP ☐

BATTERY ☐ CHECK ☐ CHARGE ☐ REPLACE

FUEL FILTER ☐ REPLACE TYPE ____

AIR CONDITIONER ☐

FAN BELTS ☐ WIPER BLADES ☐

☐ ☐

TOTAL SERVICE & PRODUCTS	13.55
ENTER HERE	19.00
SUB TOTAL	32.55
TAX MUNICIPAL $ @ %	
STATE SALES OR USE $ @ %	.25
TOTAL AMOUNT	$32.80

CONDITIONS OF REPAIR & PARTS ORDER

This labor and material is ordered by me for which I have authority to order, to be listed at your regular prices. I agree to pay cash when work is completed, or on satisfactory terms to you, and until paid in full it shall constitute a lien on this automobile. If collection is made by suit or otherwise, I agree to pay interest until paid, also collection costs, including a reasonable attorney's fee.

Customer's Signature ____

EMERGENCY ROAD CALL

LOCATION

TIME | CONTACT | ARR. | COMPL.

SERVICEMAN Tom

PAYMENT RECEIVED ☑ CASH ☐ CREDIT CARD

CUSTOMER'S COPY

FORM A-641-D REV. 5-70

CLUSTER ONE -- SALES

Unit 3

Route Salesman

While scanning the help wanted section of the paper, Fred O'lay noticed this ad:

> Driver Wanted: Travel within 75 mi.
> radius of local office, base salary
> + commission, established route, must
> have chauffeur's license, phone 123-4567

The ad had several facts that were attractive to Fred. He would be able to live at home; driving was something he enjoyed doing; he had ~~just~~ passed his chauffeur license written and road test; and he wanted the challenge of working on commission or unit work, commonly called piece work.

Note: For this job, age is important. Why? Also, it should be noted that in most cases, when a person starts a job as a route salesman (or saleswoman), he (she) would start as a helper on the truck. We will assume, for the purposes of this unit, that the new employee will start as a driver.

Fred called the number in the ad and arranged for an interview. While he was talking to the manager he was told that the job was driving a pop or beverage truck. There would be a short exam as part of the pre-employment interview. The following is a sample of the test he took:

Since the truck will be loaded by warehouse people, add these different columns of numbers to find the total case load.

1. Day 1		2. Day 2		3. Day 3	
Type 1	75	Type 1	60	Type 1	74
Type 2	60	Type 3	110	Type 2	60
Type 3	90	Type 4	77	Type 3	46
Type 4	120	Type 5	28	Type 4	100
Type 5	86	Type 6	40	Type 5	44
Type 6	17	Type 7	95	Type 6	76

Credit is given for each case of empties returned. This amounts, on the average, to 85 cents per case. Find these credits:

4. 24 cases _______ 5. 72 cases _______ 6. 18 cases _______ 7. 122 cases ____

Find the costs of this order:

8. 17 cases @ $1.92 a.__________

47 cases @ 1.67 b.__________

23 cases @ 1.83 c.__________

Total d.__________

Before going on, be sure to check with your teacher.

As part of the interview Fred also found that the salary he would be getting -- if he were employed -- amounted to $75 per week plus commission.

The commission on this job was 5 cents per case of beverage sold.

Fred was not a great math student in high school, but he could add numbers quickly and correctly. When it came to multiplying, the placement of the decimal point was very important because in a number like $47.62, if we misplace the point, we could have $4.76 or $476.20 or even $4,760. Fred quickly realized he would have to review his multiplication facts.

During the interview Fred was told he would be responsible for handling large sums of money and that his success on the job would depend on his own sales talents. For these reasons, the interviewer asked several questions about his honesty and integrity. Also, Fred had to supply a list of four names as references, none of whom could be relatives.

Three days later, Fred was called to begin work the next week. He would be riding with an experienced driver for the first week; after that, he would be on his own.

The truck was loaded when Fred and the driver reported at 7:30 a.m. Monday. Work started at 8 a.m., so Fred had time to look over the load slips and the route for the the day. His next job was to inventory the load and compare it with the load slips. This seemed stupid! After all, didn't those warehouse guys know anything: Fred counted these amounts:

Type 1, 8 oz.	25 cases
Type 1, 12 oz.	50 cases
Type 1, 16 oz.	48 cases
Type 1, 16 oz. diet	22 cases

9. Total of type 1 __________

Type 2, 10 oz.	53 cases
Type 2, 16 oz.	78 cases

10. Total of type 2 __________

Type 3, 8 oz.	96 cases
Type 3, 16 oz.	72 cases
Type 3, 16 oz.	70 cases

11. Total of type 3 __________

12. Total cases on load __________

When Fred compared the totals with his load slip, they were the same; he got in the truck and waited for the driver. While sitting there he remembered the driver had said that they generally moved about the same number of cases of type 1 diet as they did regular type 1. The load inventory showed quite a difference. Then he looked at his load slips and saw that he should have 35 of each type. He had the warehouse correct the error. Was it important to double check the load?

At the first stop, Fred went in and checked the current inventory, which is the amount of stock on hand. He saw from the records that Mr. Green normally carried in stock:

	There were in stock:
5 cases of type 1, 8 oz.	4 cases of type 1, 8 oz.
7 cases of type 1, 12 oz.	5 cases of type 1, 12 oz.
5 cases of type 1, 16 oz.	3 cases of type 1, 16 oz.
5 cases of type 1, 16 oz. diet	2 cases of type 1, 16 oz diet
15 cases of type 2, 16 oz.	8 cases of type 2, 16 oz.
10 cases of type 3, 8 oz.	5 cases of type 3, 8 oz.
5 cases of type 3, 16 oz.	4 cases of type 3, 16 oz.
Total cases 13. a.__________	Total cases b.__________

Find the cost of this order.

14. _____ cases of type 1, 8 oz. @ \$1.67 = _____

_____ cases of type 1, 12 oz. @ \$1.83 = _____

_____ cases of type 1, 16 oz. @ \$1.92 = _____

_____ cases of type 1, 16 oz.diet@ \$1.92 = _____

_____ cases of type 2, 16 oz. @ \$1.92 = _____

_____ cases of type 3, 8 oz. @ \$1.67 = _____

_____ cases of type 3, 16. oz. @ \$1.92 = _____

______Total cases needed Total cost ________

Mr. Green has 17 cases of empties. He gets 85 cents per case credit on them. This credit amounts to 15.______. What is the total bill after the credit for the empties has been given? 16.______

Note: Retailers like Mr. Green do not pay state sales tax on the orders they buy wholesale from a distributor. State sales tax is paid only once, by the customer on his retail cost.

At the next stop Fred leaves the following:

2 cases of type 1, 8 oz.
3 cases of type 1, 16 oz.
4 cases of type 1, 16 oz. diet
3 cases of type 2, 10 oz. (same cost as 8 oz.)
1 case of type 3, 8 oz.
3 cases of type 3, 16 oz.
3 cases of type 3, 16 oz. diet

Using $1.67/case for 8 oz., $1.83/case for 12 oz., and $1.92/case for 16 oz. What is the total cost of the above delivery? 17.________

If Fred picks up 15 cases of empties, this amounts to 18.______ @ 85 cents a case. What is the total bill for the goods? 19.______

20. The next stop was a large super market. Here he left the following:

a. 15 cases of type 1, 8 oz. @ $1.67 = _______

b. 20 cases of type 1, 10 oz. @ $1.83 = _______

c. 20 cases of type 1, 16 oz. @ $1.92 = _______

d. 25 cases of type 1, 16 oz. diet @ $1.92 = _______

e. 30 cases of type 2, 10 oz. @ $1.83 = _______

f. 27 cases of type 2, 16 oz. @ $1.92 = _______

g. 33 cases of type 3, 8 oz. @ $1.67 = _______

h. 25 cases of type 3, 16 oz. @ $1.92 = _______

i. 25 cases of type 3, 16 oz. diet @ $1.92 = _______

j. Total cost_______________

k. Credit for 117 cases of empties_________

l. Total bill_______________

Fred's company gives a three percent discount on the total bill for large sales like this one. It amounts to 21.______. The super market will pay Fred how much? 22.______

The day is not over for Fred yet. He has some short stops to make. Let's figure out how many cases he has moved and how many cases he has left on the truck.

23. Total cases sold _________ (so far)

24. Number cases left_________

25. Money Fred has at this time_________

26. Commission at this time__________

When he gets back to the office in the evening, he turns in his receipts and records. These are checked out, the empties are unloaded, and the truck is inventoried and reloaded for the next day by the warehouse crew. Of course, Fred has indicated what he wants on his load for the route tomorrow.

The first day was a good day!

CLUSTER ONE -- SALES

Unit 4

Auto Salesman

All through high school Joe was interested in cars. His brother Pete worked as an auto salesman for a local used car lot. Pete explained to Joe that salesmen from one lot were quite different from those from another, especially if the two lots were of different size. As a result, when Joe asked his brother about the auto sales business, Pete had to break it down into separate areas.

To help give Joe some background information about auto sales, Pete asked his brother to look into this job with his high school counselor. Joe discovered that most salesmen work for new car dealers. In fact, almost 100,000 of the 120,000 auto salesmen do work for new car dealers. Joe's counselor told him that most auto salesmen earn $125 to $225 a week and a really good one can earn much, much more than that.

Joe was concerned about whether he could find a job selling cars and he was happy to hear that 2,300 are needed each year just to keep even with the number working in the field now. Even more will be needed as new positions are created because of expansion in the industry and as salesmen leave to get other work.

Joe listed some advantages and some disadvantages to being an auto salesman.

Advantages

A demonstrator or at least a discount on your car

Adequate fringe benefits -- life insurance, hospitalization, etc.

Good future for the person who can sell

Enjoyment in working with an interesting product (cars)

Usually clean, neat working conditions

Disadvantages

Long hours -- evenings and weekends

Slump periods of the year when few sales are made

Much competition with other salesmen for sales

Earnings based, in part at least, on total sales

Pete felt it was important that his brother have some basic background in math, so he gave Joe some sample problems. See what you can do with the problems he got.

Round off the following numbers to the nearest $10.

1. $67.50 is ______

2. $211.67 is ________

Addition, multiplication, division

3. 2 yrs.
   7 months
   1½ yrs.

4. $10 per month is $________per

5. $84 per year is $_________per month

Find the following percentages:

6. 25% of $800 = _________

7. 20% of $3,475 = _________

8. 30% of $2,000 = _________

9. Find 20% of $5,476.85 _________

Gross price is the total retail price. Net is the profit after expenses. What is the net amount a store receives if the selling price is $4,180, salesman's pay is $49, costs of advertising $20, and overhead $80? 10.________

Before you do anything more in this unit, check with your teacher to clear up any questions you may have on the first 10 problems.

Pete drove Joe to a medium-sized lot (handles 40 to 50 cars). There Joe met Don, the owner. Don explained that there are many costs to the dealer the buyer doesn't see. He gave Pete a list of costs for his operation. They are 1) lot lease -- $700 per month, 2) local and state licenses -- $100 for both per year, 3) insurance -- $1,500 per year, 4) lot maintenance -- $75 per month, 5) miscellaneous supplies -- $45 per month, 6) electric bill -- $60 per month, 7) telephone -- $50 per month, 8) bond for selling cars -- $60 per year, 9) advertising -- $60 per month, 10) heat for seven months @ $20 per month, and 11) plowing the lot -- 10 times @ $50 per time. What is Don's overhead (running expenses) for the year? 11.__________

If this lot averages four cars sold each week for 52 weeks, the number of cars sold for the year is 12.__________. Each car sold must absorb part of the overhead costs. The average per car overhead cost is 13.__________. For future problems, round this figure off to the nearest ten dollars. Put it in the box at the right for reference.

14. overhead $__________

Don immediately cautioned Joe that overhead wasn't the only amount to be added to the basic price of the car. As an example of how to figure costs on a car, he used a late model Buick Skylark. The asking price on the car is $2,700. One fourth of this gross price goes to the salesman. He would receive 15.__________ Deducting the salesman's pay and the overhead, the net amount the dealer would receive is 16.__________.

A person buying the car for $2,700 + 3 percent sales tax would have a total bill of 17.__________

Don then asked Joe to figure the costs of a 1970 Chevrolet having an asking price of $3,100. What would the salesman's commission be? 18.__________ The net amount the dealer would receive would be (don't forget overhead) 19.__________.

Joe asked for one more problem. Don gave him this one. An older Oldsmobile was selling for $595. The salesman's commission would be 20.__________. The net amount the dealer would get is 21.__________.

Working from a different point of view, Don gave an example of a man wanting to trade in a car on a newer one. The man had a 1966 Oldsmobile to trade for the late model Buick Skylark ($2,700 selling price) mentioned earlier. Each dealer has a book listing typical prices paid for cars. [See your teacher for a sample.] The book gives a wholesale and retail figure for each car. The wholesale price takes into consideration average overhead and commission expected on the car. The difference between the wholesale and retail price should be the amount the overhead and commission is. If the retail price (the price they expect to sell the car at) of the Oldsmobile is $1,000, the overhead is $70, and the salesman's commission is 25 percent, what price should the dealer offer for the car in trade?

Remember commission is figured on the gross amount.

Example	$1,000 retail price	$1,000	$750
	x .25 commission	minus 250	then minus 70 overhead
	5000	$ 750	$680 offer in trade
	2000		
	$250.00 in commission		

Of course, we are assuming full percentage commission on both the newer car sold and the car to be taken in trade when it is sold. Usually, the dealer will give more in trade in such cases, because he is realizing a profit on the Buick. He will give as high as $850 to $950 for the Oldsmobile, therefore losing $20 if $950 ($1,000 [retail] - $70 [overhead] = $930 [net]) or making $80 for commission if $850 ($1,000 - $70 = $930, then $930 - $850 = $80 profit). This would be far below the 25 percent commission, but would insure selling the Buick.

Joe knew that in order to sell cars in the lot, a salesman will often need to take a trade. He asked Don for some sample problems so that he could find the trade-in prices. These were the problems Joe got from Don. See if you can find the trade-in price on each.

Assuming full commission and overhead is to be paid by the dealer, what would he be able to pay for a 1968 Chevrolet whose retail price is $750. Hint: Subtract 25 percent commission from the retail cost; then subtract the overhead from the resulting amount. 22.__________.

What is the amount the dealer would offer for a 1969 Opel retailing for $850? 23.____

Joe then asked about a new car salesman. Don explained that a new car salesman's overhead would be considerably higher than a used car salesman's, primarily because of the cost of a showroom and more advertising. Don thought that $200 is the average cost of overhead per car. A formula system is often used by new car sellers. This formula, for determining the lowest price a new car can be sold for, is generally taking 20 percent off the sticker price (price on the window) and then adding overhead to the resulting amount. So, for a new car with a sticker price of $4,000, the salesman would be authorized to go as low as $4,000 - $800 (20 percent off) plus $200 which equals $3,400. Of course, he can go above this figure, but not below it without authorization.

What is the lowest selling cost of a car with a sticker price of $4,600? 24.__________

of $3,300? 25.__________

of $2,150? 26.__________

A new car salesman averages two cars sold per month for eleven months a year. The average selling price of the cars is $3,200. How much in commission (at 25 percent of gross amount) does he make a year? 27.__________

Joe summarized the things he learned that day. He realized that overhead and commission are a large part of the price of a car. A new car has a larger overhead than a used car. A new car salesman, while earning a larger amount of money on any one sale (because of the larger cost of the car) will probably not make as much money as a used car salesman because of volume. He thanked Don and Pete for their help.

CLUSTER ONE -- SALES

Unit 5

Cashier

Cass had graduated from high school last June and had participated in the office education program offered during her junior and senior years. She loved the "on your toes" aspect of working in an office so she was delighted that some companies were responding to her letters of inquiry about possible employment.

Right after school was finished for the summer, Cass was interviewed by four companies. The pre-employment test given by one of the companies is as follows:

1. 54 + 26 + 32.6 + 14.89 = __________
2. 3 items @ $4.63 each = __________
3. 3 % of $683.45 = $__________
4. ¼ of $18.64 = $__________
5. (45 x 3.62) + (16 x 2.91) = __________
6. 35 items @ 25¢ = $__________
7. (3 x 20) - 54.82 = __________
8. 5% of $1,581.42 = $__________
9. 18 x 48 = __________
10. 16.31 + 14.86 + 12.98 = __________

Check with your instructor to see if you can go on to the rest of the unit.

Since only one of them, the No Doze Sleep Shop, really interested her, Cass was quite pleased when Mr. Laird called her on Thursday, told her that her interview and test were satisfactory, and said she should begin work the following Monday.

The working staff consisted of six sales girls on the floor demonstrating the merchandise and two stock boys taking care of restocking the area, bringing the new units to the customer pick-up area, and occasionally making home deliveries. Her job as cashier would be to handle the actual money transactions and credit sales, prepare the daily bank deposits, set the till for the next day, take care of giving credit to customers returning merchandise, and handle the payroll each week for the sales staff and stock boys.

Monday morning came and Cass reported to work at 7:30. She was to start usually at 8 a.m., but she thought that she'd make a better impression at the sleep shop if she arrived early enough to look over the area more closely. For the first day or so, she would be assisted by Mrs. Winsome who was going on maternity leave.

Cass' first task was to check the register. The ideal cash set up would be 1 - \$20, 3 - \$10, 4 - \$5, 15 - \$1, 34 - 25¢, 40 - 10¢, 40 - 5¢, and 50 - 1¢. This comes to 11. \$__________.

She was informed that this would be the proper setup each evening when she left. The rest would have to be prepared for deposit in Crystal State Bank and given to the manager, who would take it over to the bank on his way home.

While Cass was acquainting herself with her responsiblíities, the first customer was brought over to her. Cass had to ring up the sale for:

1 inner spring and mattress @ $189.95

1 mattress cover @ $4.32

2 pillows @ $3.50 each

2 pillow cases @ $2.58 each

1 electric blanket with dual controls @ $18.68

12. The bill came to $__________

13. Sales tax at 3% was __________

14. Total cost $__________

The customer wanted to pay with her Easy Snooze Credit Card, account 516-391-84-1-N. Cass was told to check this against the classified list of delinquent credit accounts before finalizing the sale. Since this one was legitimate, Cass rang it up on the till, being careful to ring up "credit sale" so that her daily totals would balance.

Immediately, Cass began to get busy with the following situations:

15. Customer wanted 3 blankets @ $6.89 each

2 sets of sheets @ $5.68 per set

1 dresser table @ $79.62

a. Total bill $__________

b. Sales tax __________

c. Total __________

Cass was paid with six $20; she gave change in what demoninations? d.______

16. Then Cass had a customer who wanted to return two twin-size sheets purchased the previous day for $6.59 each. The customer had decided to get a full-size bed instead and had no use for these sheets. She had the receipt, which was for a.______ for the sheets and b.______ tax. So Cass refunded c.______ from the register, being careful to enter it as a refund so as to keep her totals straight.

17. The next customer wanted

1 set of bunk beds @ $142.50
2 mattresses @ $45.82 each
2 pillows @ $3.35 each
6 sheets @ $4.82 a pair
3 pillow cases @ $1.48 each
2 blankets @ $14.89 each

Total bill, including three percent sales tax, came to $__________

The customer paid by check.

Cass found that most of her time was taken up with customer relations in one way or the other. By the end of the week, though, she was replaced on her job so that she could calculate the bi-weekly payroll. This would not be issued for another week, but it had to be ready a few days early.

Sally was the first employee she handled. Sally's time card showed that she had worked a total of 46 hours the first week and 41 hours the second week. Her base rate was $2.06 per hour, with time and a half for overtime (any hours worked over 40 in one week). She was also paid a commission on her sales:

	at least	less than
3% on sales from	0	$1,000
5% on sales from	$1,000	$2,000
7% on sales from	$2,000	$5,000
10% on sales from	$5,000	and up

Sally had sold $2,562.38 during that two week period. She was single, but her younger sister lived with her so she had two exemptions. She was also participating in the health insurance plan whereby she paid one fourth and her employer paid three fourths of the bi-weekly premium of $12.64. Cass figured her wages as follows:

Total hours	80	Hourly rate $2.06	Regular wages	18.	$ ________
Overtime	7	Overtime (1½)	Overtime wages	19.	$ ________
		Commissions 3% of $1,000 =		20.	________
		5% of $1,000 =		21.	________
		7% of $562.38 =		22.	________
			Total wages	23.	$ ________

Notice that the total amount of commissions adds up to $2,562.38.

Once Sally's gross wage had been calculated, $305.80 in this case, Cass prepared a statement that looked like this.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions
80	$164.80	7	$21.63	$119.37	$305.80	S	2

Fed. W/H	F.I C.A.	State W/H	Health Plan	Net Wages
$40.30	$15.90	$11.70	$3.18	$234.72

Cass had to look in the appropriate tables in Circular E, Employer's Tax Guide for the Federal Withholding and Social Security amounts, and then in the Minnesota Income Tax Withholding Tables for the Minnesota tax. These tables are included at the end of the unit. The cost of Sally's Health Plan was determined by taking one fourth of the bi-weekly premium of $12.64. Subtracting all these deductions from Sally's gross wages resulted in Sally's net wages.

Try figuring the wages for the other five sales girls, given the following facts: (All girls receive base per hour pay of $2.06 and time and a half for overtime.)

24. Sue: 24 hours the first week; 48 hours the second week; total sales $1,624.62; Married, but claiming 0 exemptions; no health plan since her husband's insurance covers her.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions

Fed. W/H	F.I.C.A.	State W/H	Health Plan	Net Wages

25. Alice: 36 hours and 29 hours; sales of $3,581.42; Single; one exemption; on health plan.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions

Fed. W/H	F.I.C.A.	State W/H	Health Plan	Net Wages

26. Roberta: 2 weeks of 48 hours each; sales of $1,839.65; married; four exemptions; on the health plan.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions

Fed. W/H	F.I.C.A.	State W/H	Health Plan	Net Wages

27. JoAnn: First week 42 hours; second week 39 hours; sales of $3,865.29; Single; 0 exemptions; on the health plan.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions

Fed. W/H	F.I.C.A.	State W/H	Health Plan	Net Wages

28. Isabelle, called "Issie" by everyone, was a widow supporting four children. This means that she was classified as single, with five exemptions. Issie had one week of 49 hours and another of 58 hours. Her sales amounted to $5,312.49, and she is on the health plan.

Hours	Wages	O.T.	Wages	Commissions	Gross	Status	Exemptions

Fed. W/H	F.I.C.A.	State W/H	Health Plan	Net Wages

With these paychecks figured out, Cass added up the gross pay to find total gross wages of 29.__________ for the sales department. All this was part of what is called "overhead" in operating a business. Cass couldn't help wondering how much profit was needed on each item so that the No Doze Sleep Shop could meet its expenses and still be considered profitable!

The final item that Cass had to take care of each day was making a bank deposit and setting up the till for the following day. During this particular day, Cass had collected checks of $146.38, $394.62, $25.16, $9.86, $105.68, $216.15, $86.32, and $55.45. In actual cash, Cass had 3-$50, 10-$20, 15-$10, 25-$5, 63-$1, 86-25¢, 6-10¢, 15-5¢, and 38-1¢. All of this came to a total of 30.$________. Remembering that she had to leave a cash setup in the till of $_______; then Cass prepared the deposit slip for 31.$_______. However, she needed an additional 32.$_______, 33.$_______, and 34.$_______ for the ideal cash setup. This came to a total of 35.$_______. She got these denominations from the manager and consequently increased her deposit slip by the same amount to give her 36.$_______. She handed this to the manager, along with her list of credit sales, and felt content that she was earning every bit of her salary.

SOCIAL SECURITY EMPLOYEE TAX TABLE

5.2 percent employee tax deductions

Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld
At least	But less than		At least	But less than		At least	But less than		At least	But less than	
$199.91	$200.10	$10.40	$212.41	$212.60	$11.05	$224.91	$225.10	$11.70	$237.41	$237.60	$12.35
200.10	200.29	10.41	212.60	212.79	11.06	225.10	225.29	11.71	237.60	237.79	12.36
200.29	200.49	10.42	212.79	212.99	11.07	225.29	225.49	11.72	237.79	237.99	12.37
200.49	200.68	10.43	212.99	213.18	11.08	225.49	225.68	11.73	237.99	238.18	12.38
200.68	200.87	10.44	213.18	213.37	11.09	225.68	225.87	11.74	238.18	238.37	12.39
200.87	201.06	10.45	213.37	213.56	11.10	225.87	226.06	11.75	238.37	238.56	12.40
201.06	201.25	10.46	213.56	213.75	11.11	226.06	226.25	11.76	238.56	238.75	12.41
201.25	201.45	10.47	213.75	213.95	11.12	226.25	226.45	11.77	238.75	238.95	12.42
201.45	201.64	10.48	213.95	214.14	11.13	226.45	226.64	11.78	238.95	239.14	12.43
201.64	201.83	10.49	214.14	214.33	11.14	226.64	226.83	11.79	239.14	239.33	12.44
201.83	202.02	10.50	214.33	214.52	11.15	226.83	227.02	11.80	239.33	239.52	12.45
202.02	202.22	10.51	214.52	214.72	11.16	227.02	227.22	11.81	239.52	239.72	12.46
202.22	202.41	10.52	214.72	214.91	11.17	227.22	227.41	11.82	239.72	239.91	12.47
202.41	202.60	10.53	214.91	215.10	11.18	227.41	227.60	11.83	239.91	240.10	12.48
202.60	202.79	10.54	215.10	215.29	11.19	227.60	227.79	11.84	240.10	240.29	12.49
202.79	202.99	10.55	215.29	215.49	11.20	227.79	227.99	11.85	240.29	240.49	12.50
202.99	203.18	10.56	215.49	215.68	11.21	227.99	228.18	11.86	240.49	240.68	12.51
203.18	203.37	10.57	215.68	215.87	11.22	228.18	228.37	11.87	240.68	240.87	12.52
203.37	203.56	10.58	215.87	216.06	11.23	228.37	228.56	11.88	240.87	241.06	12.53
203.56	203.75	10.59	216.06	216.25	11.24	228.56	228.75	11.89	241.06	241.25	12.54
203.75	203.95	10.60	216.25	216.45	11.25	228.75	228.95	11.90	241.25	241.45	12.55
203.95	204.14	10.61	216.45	216.64	11.26	228.95	229.14	11.91	241.45	241.64	12.56
204.14	204.33	10.62	216.64	216.83	11.27	229.14	229.33	11.92	241.64	241.83	12.57
204.33	204.52	10.63	216.83	217.02	11.28	229.33	229.52	11.93	241.83	242.02	12.58
204.52	204.72	10.64	217.02	217.22	11.29	229.52	229.72	11.94	242.02	242.22	12.59
204.72	204.91	10.65	217.22	217.41	11.30	229.72	229.91	11.95	242.22	242.41	12.60
204.91	205.10	10.66	217.41	217.60	11.31	229.91	230.10	11.96	242.41	242.60	12.61
205.10	205.29	10.67	217.60	217.79	11.32	230.10	230.29	11.97	242.60	242.79	12.62
205.29	205.49	10.68	217.79	217.99	11.33	230.29	230.49	11.98	242.79	242.99	12.63
205.49	205.68	10.69	217.99	218.18	11.34	230.49	230.68	11.99	242.99	243.18	12.64
205.68	205.87	10.70	218.18	218.37	11.35	230.68	230.87	12.00	243.18	243.37	12.65
205.87	206.06	10.71	218.37	218.56	11.36	230.87	231.06	12.01	243.37	243.56	12.66
206.06	206.25	10.72	218.56	218.75	11.37	231.06	231.25	12.02	243.56	243.75	12.67
206.25	206.45	10.73	218.75	218.95	11.38	231.25	231.45	12.03	243.75	243.95	12.68
206.45	206.64	10.74	218.95	219.14	11.39	231.45	231.64	12.04	243.95	244.14	12.69
206.64	206.83	10.75	219.14	219.33	11.40	231.64	231.83	12.05	244.14	244.33	12.70
206.83	207.02	10.76	219.33	219.52	11.41	231.83	232.02	12.06	244.33	244.52	12.71
207.02	207.22	10.77	219.52	219.72	11.42	232.02	232.22	12.07	244.52	244.72	12.72
207.22	207.41	10.78	219.72	219.91	11.43	232.22	232.41	12.08	244.72	244.91	12.73
207.41	207.60	10.79	219.91	220.10	11.44	232.41	232.60	12.09	244.91	245.10	12.74
207.60	207.79	10.80	220.10	220.29	11.45	232.60	232.79	12.10	245.10	245.29	12.75
207.79	207.99	10.81	220.29	220.49	11.46	232.79	232.99	12.11	245.29	245.49	12.76
207.99	208.18	10.82	220.49	220.68	11.47	232.99	233.18	12.12	245.49	245.68	12.77
208.18	208.37	10.83	220.68	220.87	11.48	233.18	233.37	12.13	245.68	245.87	12.78
208.37	208.56	10.84	220.87	221.06	11.49	233.37	233.56	12.14	245.87	246.06	12.79
208.56	208.75	10.85	221.06	221.25	11.50	233.56	233.75	12.15	246.06	246.25	12.80
208.75	208.95	10.86	221.25	221.45	11.51	233.75	233.95	12.16	246.25	246.45	12.81
208.95	209.14	10.87	221.45	221.64	11.52	233.95	234.14	12.17	246.45	246.64	12.82
209.14	209.33	10.88	221.64	221.83	11.53	234.14	234.33	12.18	246.64	246.83	12.83
209.33	209.52	10.89	221.83	222.02	11.54	234.33	234.52	12.19	246.83	247.02	12.84
209.52	209.72	10.90	222.02	222.22	11.55	234.52	234.72	12.20	247.02	247.22	12.85
209.72	209.91	10.91	222.22	222.41	11.56	234.72	234.91	12.21	247.22	247.41	12.86
209.91	210.10	10.92	222.41	222.60	11.57	234.91	235.10	12.22	247.41	247.60	12.87
210.10	210.29	10.93	222.60	222.79	11.58	235.10	235.29	12.23	247.60	247.79	12.88
210.29	210.49	10.94	222.79	222.99	11.59	235.29	235.49	12.24	247.79	247.99	12.89
210.49	210.68	10.95	222.99	223.18	11.60	235.49	235.68	12.25	247.99	248.18	12.90
210.68	210.87	10.96	223.18	223.37	11.61	235.68	235.87	12.26	248.18	248.37	12.91
210.87	211.06	10.97	223.37	223.56	11.62	235.87	236.06	12.27	248.37	248.56	12.92
211.06	211.25	10.98	223.56	223.75	11.63	236.06	236.25	12.28	248.56	248.75	12.93
211.25	211.45	10.99	223.75	223.95	11.64	236.25	236.45	12.29	248.75	248.95	12.94
211.45	211.64	11.00	223.95	224.14	11.65	236.45	236.64	12.30	248.95	249.14	12.95
211.64	211.83	11.01	224.14	224.33	11.66	236.64	236.83	12.31	249.14	249.33	12.96
211.83	212.02	11.02	224.33	224.52	11.67	236.83	237.02	12.32	249.33	249.52	12.97
212.02	212.22	11.03	224.52	224.72	11.68	237.02	237.22	12.33	249.52	249.72	12.98
212.22	212.41	11.04	224.72	224.91	11.69	237.22	237.41	12.34	249.72	249.91	12.99

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SOCIAL SECURITY EMPLOYER TAX TABLE--CONTINUED

5.2 percent employee tax deductions

Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld
At least	But less than		At least	But less than		At least	But less than		At least	But less than	
$249.91	$250.10	$13.00	$262.41	$262.60	$13.65	$274.91	$275.10	$14.30	$287.41	$287.60	$14.95
250.10	250.29	13.01	262.60	262.79	13.66	275.10	275.29	14.31	287.60	287.79	14.96
250.29	250.49	13.02	262.79	262.99	13.67	275.29	275.49	14.32	287.79	287.99	14.97
250.49	250.68	13.03	262.99	263.18	13.68	275.49	275.68	14.33	287.99	288.18	14.98
250.68	250.87	13.04	263.18	263.37	13.69	275.68	275.87	14.34	288.18	288.37	14.99
250.87	251.06	13.05	263.37	263.56	13.70	275.87	276.06	14.35	288.37	288.56	15.00
251.06	251.25	13.06	263.56	263.75	13.71	276.06	276.25	14.36	288.56	288.75	15.01
251.25	251.45	13.07	263.75	263.95	13.72	276.25	276.45	14.37	288.75	288.95	15.02
251.45	251.64	13.08	263.95	264.14	13.73	276.45	276.64	14.38	288.95	289.14	15.03
251.64	251.83	13.09	264.14	264.33	13.74	276.64	276.83	14.39	289.14	289.33	15.04
251.83	252.02	13.10	264.33	264.52	13.75	276.83	277.02	14.40	289.33	289.52	15.05
252.02	252.22	13.11	264.52	264.72	13.76	277.02	277.22	14.41	289.52	289.72	15.06
252.22	252.41	13.12	264.72	264.91	13.77	277.22	277.41	14.42	289.72	289.91	15.07
252.41	252.60	13.13	264.91	265.10	13.78	277.41	277.60	14.43	289.91	290.10	15.08
252.60	252.79	13.14	265.10	265.29	13.79	277.60	277.79	14.44	290.10	290.29	15.09
252.79	252.99	13.15	265.29	265.49	13.80	277.79	277.99	14.45	290.29	290.49	15.10
252.99	253.18	13.16	265.49	265.68	13.81	277.99	278.18	14.46	290.49	290.68	15.11
253.18	253.37	13.17	265.68	265.87	13.82	278.18	278.37	14.47	290.68	290.87	15.12
253.37	253.56	13.18	265.87	266.06	13.83	278.37	278.56	14.48	290.87	291.06	15.13
253.56	253.75	13.19	266.06	266.25	13.84	278.56	278.75	14.49	291.06	291.25	15.14
253.75	253.95	13.20	266.25	266.45	13.85	278.75	278.95	14.50	291.25	291.45	15.15
253.95	254.14	13.21	266.45	266.64	13.86	278.95	279.14	14.51	291.45	291.64	15.16
254.14	254.33	13.22	266.64	266.83	13.87	279.14	279.33	14.52	291.64	291.83	15.17
254.33	254.52	13.23	266.83	267.02	13.88	279.33	279.52	14.53	291.83	292.02	15.18
254.52	254.72	13.24	267.02	267.22	13.89	279.52	279.72	14.54	292.02	292.22	15.19
254.72	254.91	13.25	267.22	267.41	13.90	279.72	279.91	14.55	292.22	292.41	15.20
254.91	255.10	13.26	267.41	267.60	13.91	279.91	280.10	14.56	292.41	292.60	15.21
255.10	255.29	13.27	267.60	267.79	13.92	280.10	280.29	14.57	292.60	292.79	15.22
255.29	255.49	13.28	267.79	267.99	13.93	280.29	280.49	14.58	292.79	292.99	15.23
255.49	255.68	13.29	267.99	268.18	13.94	280.49	280.68	14.59	292.99	293.18	15.24
255.68	255.87	13.30	268.18	268.37	13.95	280.68	280.87	14.60	293.18	293.37	15.25
255.87	256.06	13.31	268.37	268.56	13.96	280.87	281.06	14.61	293.37	293.56	15.26
256.06	256.25	13.32	268.56	268.75	13.97	281.06	281.25	14.62	293.56	293.75	15.27
256.25	256.45	13.33	268.75	268.95	13.98	281.25	281.45	14.63	293.75	293.95	15.28
256.45	256.64	13.34	268.95	269.14	13.99	281.45	281.64	14.64	293.95	294.14	15.29
256.64	256.83	13.35	269.14	269.33	14.00	281.64	281.83	14.65	294.14	294.33	15.30
256.83	257.02	13.36	269.33	269.52	14.01	281.83	282.02	14.66	294.33	294.52	15.31
257.02	257.22	13.37	269.52	269.72	14.02	282.02	282.22	14.67	294.52	294.72	15.32
257.22	257.41	13.38	269.72	269.91	14.03	282.22	282.41	14.68	294.72	294.91	15.33
257.41	257.60	13.39	269.91	270.10	14.04	282.41	282.60	14.69	294.91	295.10	15.34
257.60	257.79	13.40	270.10	270.29	14.05	282.60	282.79	14.70	295.10	295.29	15.35
257.79	257.99	13.41	270.29	270.49	14.06	282.79	282.99	14.71	295.29	295.49	15.36
257.99	258.18	13.42	270.49	270.68	14.07	282.99	283.18	14.72	295.49	295.68	15.37
258.18	258.37	13.43	270.68	270.87	14.08	283.18	283.37	14.73	295.68	295.87	15.38
258.37	258.56	13.44	270.87	271.06	14.09	283.37	283.56	14.74	295.87	296.06	15.39
258.56	258.75	13.45	271.06	271.25	14.10	283.56	283.75	14.75	296.06	296.25	15.40
258.75	258.95	13.46	271.25	271.45	14.11	283.75	283.95	14.76	296.25	296.45	15.41
258.95	259.14	13.47	271.45	271.64	14.12	283.95	284.14	14.77	296.45	296.64	15.42
259.14	259.33	13.48	271.64	271.83	14.13	284.14	284.33	14.78	296.64	296.83	15.43
259.33	259.52	13.49	271.83	272.02	14.14	284.33	284.52	14.79	296.83	297.02	15.44
259.52	259.72	13.50	272.02	272.22	14.15	284.52	284.72	14.80	297.02	297.22	15.45
259.72	259.91	13.51	272.22	272.41	14.16	284.72	284.91	14.81	297.22	297.41	15.46
259.91	260.10	13.52	272.41	272.60	14.17	284.91	285.10	14.82	297.41	297.60	15.47
260.10	260.29	13.53	272.60	272.79	14.18	285.10	285.29	14.83	297.60	297.79	15.48
260.29	260.49	13.54	272.79	272.99	14.19	285.29	285.49	14.84	297.79	297.99	15.49
260.49	260.68	13.55	272.99	273.18	14.20	285.49	285.68	14.85	297.99	298.18	15.50
260.68	260.87	13.56	273.18	273.37	14.21	285.68	285.87	14.86	298.18	298.37	15.51
260.87	261.06	13.57	273.37	273.56	14.22	285.87	286.06	14.87	298.37	298.56	15.52
261.06	261.25	13.58	273.56	273.75	14.23	286.06	286.25	14.88	298.56	298.75	15.53
261.25	261.45	13.59	273.75	273.95	14.24	286.25	286.45	14.89	298.75	298.95	15.54
261.45	261.64	13.60	273.95	274.14	14.25	286.45	286.64	14.90	298.95	299.14	15.55
261.64	261.83	13.61	274.14	274.33	14.26	286.64	286.83	14.91	299.14	299.33	15.56
261.83	262.02	13.62	274.33	274.52	14.27	286.83	287.02	14.92	299.33	299.52	15.57
262.02	262.22	13.63	274.52	274.72	14.28	287.02	287.22	14.93	299.52	299.72	15.58
262.22	262.41	13.64	274.72	274.91	14.29	287.22	287.41	14.94	299.72	299.91	15.59

SOCIAL SECURITY EMPLOYER TAX TABLE--CONTINUED

5.2 percent employee tax deductions

Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld	Wages		Tax to be withheld
At least	But less than		At least	But less than		At least	But less than		At least	But less than	
$299.91	$300.10	$15.60	$312.41	$312.60	$16.25	$324.91	$325.10	$16.90	$337.41	$337.60	$17.55
300.10	300.29	15.61	312.60	312.79	16.26	325.10	325.29	16.91	337.60	337.79	17.56
300.29	300.49	15.62	312.79	312.99	16.27	325.29	325.49	16.92	337.79	337.99	17.57
300.49	300.68	15.63	312.99	313.18	16.28	325.49	325.68	16.93	337.99	338.18	17.58
300.68	300.87	15.64	313.18	313.37	16.29	325.68	325.87	16.94	338.18	338.37	17.59
300.87	301.06	15.65	313.37	313.56	16.30	325.87	326.06	16.95	338.37	338.56	17.60
301.06	301.25	15.66	313.56	313.75	16.31	326.06	326.25	16.96	338.56	338.75	17.61
301.25	301.45	15.67	313.75	313.95	16.32	326.25	326.45	16.97	338.75	338.95	17.62
301.45	301.64	15.68	313.95	314.14	16.33	326.45	326.64	16.98	338.95	339.14	17.63
301.64	301.83	15.69	314.14	314.33	16.34	326.64	326.83	16.99	339.14	339.33	17.64
301.83	302.02	15.70	314.33	314.52	16.35	326.83	327.02	17.00	339.33	339.52	17.65
302.02	302.22	15.71	314.52	314.72	16.36	327.02	327.22	17.01	339.52	339.72	17.66
302.22	302.41	15.72	314.72	314.91	16.37	327.22	327.41	17.02	339.72	339.91	17.67
302.41	302.60	15.73	314.91	315.10	16.38	327.41	327.60	17.03	339.91	340.10	17.68
302.60	302.79	15.74	315.10	315.29	16.39	327.60	327.79	17.04	340.10	340.29	17.69
302.79	302.99	15.75	315.29	315.49	16.40	327.79	327.99	17.05	340.29	340.49	17.70
302.99	303.18	15.76	315.49	315.68	16.41	327.99	328.18	17.06	340.49	340.68	17.71
303.18	303.37	15.77	315.68	315.87	16.42	328.18	328.37	17.07	340.68	340.87	17.72
303.37	303.56	15.78	315.87	316.06	16.43	328.37	328.56	17.08	340.87	341.06	17.73
303.56	303.75	15.79	316.06	316.25	16.44	328.56	328.75	17.09	341.06	341.25	17.74
303.75	303.95	15.80	316.25	316.45	16.45	328.75	328.95	17.10	341.25	341.45	17.75
303.95	304.14	15.81	316.45	316.64	16.46	328.95	329.14	17.11	341.45	341.64	17.76
304.14	304.33	15.82	316.64	316.83	16.47	329.14	329.33	17.12	341.64	341.83	17.77
304.33	304.52	15.83	316.83	317.02	16.48	329.33	329.52	17.13	341.83	342.02	17.78
304.52	304.72	15.84	317.02	317.22	16.49	329.52	329.72	17.14	342.02	342.22	17.79
304.72	304.91	15.85	317.22	317.41	16.50	329.72	329.91	17.15	342.22	342.41	17.80
304.91	305.10	15.86	317.41	317.60	16.51	329.91	330.10	17.16	342.41	342.60	17.81
305.10	305.29	15.87	317.60	317.79	16.52	330.10	330.29	17.17	342.60	342.79	17.82
305.29	305.49	15.88	317.79	317.99	16.53	330.29	330.49	17.18	342.79	342.99	17.83
305.49	305.68	15.89	317.99	318.18	16.54	330.49	330.68	17.19	342.99	343.18	17.84
305.68	305.87	15.90	318.18	318.37	16.55	330.68	330.87	17.20	343.18	343.37	17.85
305.87	306.06	15.91	318.37	318.56	16.56	330.87	331.06	17.21	343.37	343.56	17.86
306.06	306.25	15.92	318.56	318.75	16.57	331.06	331.25	17.22	343.56	343.75	17.87
306.25	306.45	15.93	318.75	318.95	16.58	331.25	331.45	17.23	343.75	343.95	17.88
306.45	306.64	15.94	318.95	319.14	16.59	331.45	331.64	17.24	343.95	344.14	17.89
306.64	306.83	15.95	319.14	319.33	16.60	331.64	331.83	17.25	344.14	344.33	17.90
306.83	307.02	15.96	319.33	319.52	16.61	331.83	332.02	17.26	344.33	344.52	17.91
307.02	307.22	15.97	319.52	319.72	16.62	332.02	332.22	17.27	344.52	344.72	17.92
307.22	307.41	15.98	319.72	319.91	16.63	332.22	332.41	17.28	344.72	344.91	17.93
307.41	307.60	15.99	319.91	320.10	16.64	332.41	332.60	17.29	344.91	345.10	17.94
307.60	307.79	16.00	320.10	320.29	16.65	332.60	332.79	17.30	345.10	345.29	17.95
307.79	307.99	16.01	320.29	320.49	16.66	332.79	332.99	17.31	345.29	345.49	17.96
307.99	308.18	16.02	320.49	320.68	16.67	332.99	333.18	17.32	345.49	345.68	17.97
308.18	308.37	16.03	320.68	320.87	16.68	333.18	333.37	17.33	345.68	345.87	17.98
308.37	308.56	16.04	320.87	321.06	16.69	333.37	333.56	17.34	345.87	346.06	17.99
308.56	308.75	16.05	321.06	321.25	16.70	333.56	333.75	17.35	346.06	346.25	18.00
308.75	308.95	16.06	321.25	321.45	16.71	333.75	333.95	17.36	346.25	346.45	18.01
308.95	309.14	16.07	321.45	321.64	16.72	333.95	334.14	17.37	346.45	346.64	18.02
309.14	309.33	16.08	321.64	321.83	16.73	334.14	334.33	17.38	346.64	346.83	18.03
309.33	309.52	16.09	321.83	322.02	16.74	334.33	334.52	17.39	346.83	347.02	18.04
309.52	309.72	16.10	322.02	322.22	16.75	334.52	334.72	17.40	347.02	347.22	18.05
309.72	309.91	16.11	322.22	322.41	16.76	334.72	334.91	17.41	347.22	347.41	18.06
309.91	310.10	16.12	322.41	322.60	16.77	334.91	335.10	17.42	347.41	347.60	18.07
310.10	310.29	16.13	322.60	322.79	16.78	335.10	335.29	17.43	347.60	347.79	18.08
310.29	310.49	16.14	322.79	322.99	16.79	335.29	335.49	17.44	347.79	347.99	18.09
310.49	310.68	16.15	322.99	323.18	16.80	335.49	335.68	17.45	347.99	348.18	18.10
310.68	310.87	16.16	323.18	323.37	16.81	335.68	335.87	17.46	348.18	348.37	18.11
310.87	311.06	16.17	323.37	323.56	16.82	335.87	336.06	17.47	348.37	348.56	18.12
311.06	311.25	16.18	323.56	323.75	16.83	336.06	336.25	17.48	348.56	348.75	18.13
311.25	311.45	16.19	323.75	323.95	16.84	336.25	336.45	17.49	348.75	348.95	18.14
311.45	311.64	16.20	323.95	324.14	16.85	336.45	336.64	17.50	348.95 and over 5.2% of wages		
311.64	311.83	16.21	324.14	324.33	16.86	336.64	336.83	17.51			
311.83	312.02	16.22	324.33	324.52	16.87	336.83	337.02	17.52			
312.02	312.22	16.23	324.52	324.72	16.88	337.02	337.22	17.53			
312.22	312.41	16.24	324.72	324.91	16.89	337.22	337.41	17.54			

FEDERAL TAX WITHHOLDING

MARRIED Persons -- BIWEEKLY Payroll Period

And the wages are—		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$0	$40	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
40	42	.10	0	0	0	0	0	0	0	0	0	0
42	44	.40	0	0	0	0	0	0	0	0	0	0
44	46	.60	0	0	0	0	0	0	0	0	0	0
46	48	.90	0	0	0	0	0	0	0	0	0	0
48	50	1.20	0	0	0	0	0	0	0	0	0	0
50	52	1.50	0	0	0	0	0	0	0	0	0	0
52	54	1.80	0	0	0	0	0	0	0	0	0	0
54	56	2.00	0	0	0	0	0	0	0	0	0	0
56	58	2.30	0	0	0	0	0	0	0	0	0	0
58	60	2.60	0	0	0	0	0	0	0	0	0	0
60	62	2.90	0	0	0	0	0	0	0	0	0	0
62	64	3.20	0	0	0	0	0	0	0	0	0	0
64	66	3.40	0	0	0	0	0	0	0	0	0	0
66	68	3.70	.20	0	0	0	0	0	0	0	0	0
68	70	4.00	.50	0	0	0	0	0	0	0	0	0
70	72	4.30	.80	0	0	0	0	0	0	0	0	0
72	74	4.60	1.10	0	0	0	0	0	0	0	0	0
74	76	4.80	1.30	0	0	0	0	0	0	0	0	0
76	78	5.10	1.60	0	0	0	0	0	0	0	0	0
78	80	5.40	1.90	0	0	0	0	0	0	0	0	0
80	82	5.70	2.20	0	0	0	0	0	0	0	0	0
82	84	6.00	2.50	0	0	0	0	0	0	0	0	0
84	86	6.30	2.70	0	0	0	0	0	0	0	0	0
86	88	6.60	3.00	0	0	0	0	0	0	0	0	0
88	90	6.90	3.30	0	0	0	0	0	0	0	0	0
90	92	7.30	3.60	.10	0	0	0	0	0	0	0	0
92	94	7.60	3.90	.40	0	0	0	0	0	0	0	0
94	96	8.00	4.10	.60	0	0	0	0	0	0	0	0
96	98	8.30	4.40	.90	0	0	0	0	0	0	0	0
98	100	8.60	4.70	1.20	0	0	0	0	0	0	0	0
100	102	9.00	5.00	1.50	0	0	0	0	0	0	0	0
102	104	9.30	5.30	1.80	0	0	0	0	0	0	0	0
104	106	9.70	5.50	2.00	0	0	0	0	0	0	0	0
106	108	10.00	5.80	2.30	0	0	0	0	0	0	0	0
108	110	10.30	6.10	2.60	0	0	0	0	0	0	0	0
110	112	10.70	6.40	2.90	0	0	0	0	0	0	0	0
112	114	11.00	6.80	3.20	0	0	0	0	0	0	0	0
114	116	11.40	7.10	3.40	0	0	0	0	0	0	0	0
116	118	11.70	7.40	3.70	.20	0	0	0	0	0	0	0
118	120	12.00	7.80	4.00	.50	0	0	0	0	0	0	0
120	124	12.50	8.30	4.40	.90	0	0	0	0	0	0	0
124	128	13.20	9.00	5.00	1.50	0	0	0	0	0	0	0
128	132	13.90	9.70	5.50	2.00	0	0	0	0	0	0	0
132	136	14.60	10.30	6.10	2.60	0	0	0	0	0	0	0
136	140	15.30	11.00	6.80	3.20	0	0	0	0	0	0	0
140	144	15.90	11.70	7.40	3.70	.20	0	0	0	0	0	0
144	148	16.60	12.40	8.10	4.30	.80	0	0	0	0	0	0
148	152	17.30	13.10	8.80	4.80	1.30	0	0	0	0	0	0
152	156	18.00	13.70	9.50	5.40	1.90	0	0	0	0	0	0
156	160	18.60	14.40	10.20	6.00	2.50	0	0	0	0	0	0
160	164	19.30	15.10	10.80	6.60	3.00	0	0	0	0	0	0
164	168	19.90	15.80	11.50	7.30	3.60	.10	0	0	0	0	0
168	172	20.50	16.50	12.20	8.00	4.10	.60	0	0	0	0	0
172	176	21.20	17.10	12.90	8.60	4.70	1.20	0	0	0	0	0
176	180	21.80	17.80	13.60	9.30	5.30	1.80	0	0	0	0	0
180	184	22.50	18.50	14.20	10.00	5.80	2.30	0	0	0	0	0
184	188	23.10	19.10	14.90	10.70	6.40	2.90	0	0	0	0	0
188	192	23.70	19.70	15.60	11.40	7.10	3.40	0	0	0	0	0
192	196	24.40	20.40	16.30	12.00	7.80	4.00	.50	0	0	0	0

FEDERAL TAX WITHHOLDING

MARRIED Persons -- BIWEEKLY Payroll Period -- Continued

And the wages are—		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$196	$200	$25.00	$21.00	$17.00	$12.70	$8.50	$4.60	$1.10	$0	$0	$0	$0
200	210	26.10	22.10	18.10	13.90	9.70	5.50	2.00	0	0	0	0
210	220	27.70	23.70	19.70	15.60	11.40	7.10	3.40	0	0	0	0
220	230	29.30	25.30	21.30	17.30	13.10	8.80	4.80	1.30	0	0	0
230	240	30.90	26.90	22.90	18.90	14.80	10.50	6.30	2.70	0	0	0
240	250	32.50	28.50	24.50	20.50	16.50	12.20	8.00	4.10	.60	0	0
250	260	34.10	30.10	26.10	22.10	18.10	13.90	9.70	5.50	2.00	0	0
260	270	35.70	31.70	27.70	23.70	19.70	15.60	11.40	7.10	3.40	0	0
270	280	37.30	33.30	29.30	25.30	21.30	17.30	13.10	8.80	4.80	1.30	0
280	290	38.90	34.90	30.90	26.90	22.90	18.90	14.80	10.50	6.30	2.70	0
290	300	40.50	36.50	32.50	28.50	24.50	20.50	16.50	12.20	8.00	4.10	.60
300	320	42.90	38.90	34.90	30.90	26.90	22.90	18.90	14.80	10.50	6.30	2.70
320	340	46.20	42.10	38.10	34.10	30.10	26.10	22.10	18.10	13.90	9.70	5.50
340	360	50.00	45.30	41.30	37.30	33.30	29.30	25.30	21.30	17.30	13.10	8.80
360	380	53.80	49.10	44.50	40.50	36.50	32.50	28.50	24.50	20.50	16.50	12.20
380	400	57.60	52.90	48.10	43.70	39.70	35.70	31.70	27.70	23.70	19.70	15.60
400	420	61.40	56.70	51.90	47.20	42.90	38.90	34.90	30.90	26.90	22.90	18.90
420	440	65.20	60.50	55.70	51.00	46.20	42.10	38.10	34.10	30.10	26.10	22.10
440	460	69.00	64.30	59.50	54.80	50.00	45.30	41.30	37.30	33.30	29.30	25.30
460	480	72.80	68.10	63.30	58.60	53.80	49.10	44.50	40.50	36.50	32.50	28.50
480	500	76.60	71.90	67.10	62.40	57.60	52.90	48.10	43.70	39.70	35.70	31.70
500	520	80.40	75.70	70.90	66.20	61.40	56.70	51.90	47.20	42.90	38.90	34.90
520	540	84.20	79.50	74.70	70.00	65.20	60.50	55.70	51.00	46.20	42.10	38.10
540	560	88.30	83.30	78.50	73.80	69.00	64.30	59.50	54.80	50.00	45.30	41.30
560	580	92.50	87.20	82.30	77.60	72.80	68.10	63.30	58.60	53.80	49.10	44.50
580	600	96.70	91.40	86.20	81.40	76.60	71.90	67.10	62.40	57.60	52.90	48.10
600	620	100.90	95.60	90.40	85.20	80.40	75.70	70.90	66.20	61.40	56.70	51.90
620	640	105.10	99.80	94.60	89.30	84.20	79.50	74.70	70.00	65.20	60.50	55.70
640	660	109.30	104.00	98.80	93.50	88.30	83.30	78.50	73.80	69.00	64.30	59.50
660	680	113.50	108.20	103.00	97.70	92.50	87.20	82.30	77.60	72.80	68.10	63.30
680	700	117.70	112.40	107.20	101.90	96.70	91.40	86.20	81.40	76.60	71.90	67.10
700	720	121.90	116.60	111.40	106.10	100.90	95.60	90.40	85.20	80.40	75.70	70.90
720	740	126.10	120.80	115.60	110.30	105.10	99.80	94.60	89.30	84.20	79.50	74.70
740	760	130.30	125.00	119.80	114.50	109.30	104.00	98.80	93.50	88.30	83.30	78.50
760	780	134.50	129.20	124.00	118.70	113.50	108.20	103.00	97.70	92.50	87.20	82.30
780	800	139.50	133.40	128.20	122.90	117.70	112.40	107.20	101.90	96.70	91.40	86.20
800	820	144.50	138.30	132.40	127.10	121.90	116.60	111.40	106.10	100.90	95.60	90.40
820	840	149.50	143.30	137.00	131.30	126.10	120.80	115.60	110.30	105.10	99.80	94.60
840	860	154.50	148.30	142.00	135.80	130.30	125.00	119.80	114.50	109.30	104.00	98.80
860	880	159.50	153.30	147.00	140.80	134.50	129.20	124.00	118.70	113.50	108.20	103.00
880	900	164.50	158.30	152.00	145.80	139.50	133.40	128.20	122.90	117.70	112.40	107.20
900	920	169.50	163.30	157.00	150.80	144.50	138.30	132.40	127.10	121.90	116.60	111.40
920	940	174.50	168.30	162.00	155.80	149.50	143.30	137.00	131.30	126.10	120.80	115.60
940	960	179.50	173.30	167.00	160.80	154.50	148.30	142.00	135.80	130.30	125.00	119.80
960	980	184.50	178.30	172.00	165.80	159.50	153.30	147.00	140.60	134.50	129.20	124.00
980	1,000	189.50	183.30	177.00	170.80	164.50	158.30	152.00	145.80	139.50	133.40	128.20
1,000	1,020	194.50	188.30	182.00	175.80	169.50	163.30	157.00	150.80	144.50	138.30	132.40
1,020	1,040	199.50	193.30	187.00	180.80	174.50	168.30	162.00	155.80	149.50	143.30	137.00
1,040	1,060	204.50	198.30	192.00	185.80	179.50	173.30	167.00	160.80	154.50	148.30	142.00
		25 percent of the excess over $1,060 plus—										
$1,060 and over		207.00	200.80	194.50	188.30	182.00	175.80	169.50	163.30	157.00	150.80	144.50

FEDERAL TAX WITHHOLDING

SINGLE Persons -- BIWEEKLY Payroll Period

And the wages are –		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$0	$40	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
40	42	.10	0	0	0	0	0	0	0	0	0	0
42	44	.40	0	0	0	0	0	0	0	0	0	0
44	46	.60	0	0	0	0	0	0	0	0	0	0
46	48	.90	0	0	0	0	0	0	0	0	0	0
48	50	1.20	0	0	0	0	0	0	0	0	0	0
50	52	1.50	0	0	0	0	0	0	0	0	0	0
52	54	1.80	0	0	0	0	0	0	0	0	0	0
54	56	2.00	0	0	0	0	0	0	0	0	0	0
56	58	2.30	0	0	0	0	0	0	0	0	0	0
58	60	2.60	0	0	0	0	0	0	0	0	0	0
60	62	2.90	0	0	0	0	0	0	0	0	0	0
62	64	3.20	0	0	0	0	0	0	0	0	0	0
64	66	3.60	0	0	0	0	0	0	0	0	0	0
66	68	3.90	.20	0	0	0	0	0	0	0	0	0
68	70	4.20	.50	0	0	0	0	0	0	0	0	0
70	72	4.60	.80	0	0	0	0	0	0	0	0	0
72	74	4.90	1.10	0	0	0	0	0	0	0	0	0
74	76	[illegible]	1.30	0	0	0	0	0	0	0	0	0
76	78	5.60	1.60	0	0	0	0	0	0	0	0	0
78	80	5.90	1.90	0	0	0	0	0	0	0	0	0
80	82	6.30	2.20	0	0	0	0	0	0	0	0	0
82	84	6.60	2.50	0	0	0	0	0	0	0	0	0
84	86	7.00	2.70	0	0	0	0	0	0	0	0	0
86	88	7.30	3.00	0	0	0	0	0	0	0	0	0
88	90	7.60	3.40	0	0	0	0	0	0	0	0	0
90	92	8.00	3.70	.10	0	0	0	0	0	0	0	0
92	94	8.30	4.10	.40	0	0	0	0	0	0	0	0
94	96	8.70	4.40	.60	0	0	0	0	0	0	0	0
96	98	9.00	4.70	.90	0	0	0	0	0	0	0	0
98	100	9.30	5.10	1.20	0	0	0	0	0	0	0	0
100	102	9.70	5.40	1.50	0	0	0	0	0	0	0	0
102	104	10.10	5.80	1.80	0	0	0	0	0	0	0	0
104	106	10.50	6.10	2.00	0	0	0	0	0	0	0	0
106	108	10.90	6.40	2.30	0	0	0	0	0	0	0	0
108	110	11.30	6.80	2.60	0	0	0	0	0	0	0	0
110	112	11.70	7.10	2.90	0	0	0	0	0	0	0	0
112	114	12.10	7.50	3.20	0	0	0	0	0	0	0	0
114	116	12.50	7.80	3.60	0	0	0	0	0	0	0	0
116	118	12.90	8.10	3.90	.20	0	0	0	0	0	0	0
118	120	13.30	8.50	4.20	.50	0	0	0	0	0	0	0
120	124	13.90	9.00	4.70	.90	0	0	0	0	0	0	0
124	128	14.70	9.70	5.40	1.50	0	0	0	0	0	0	0
128	132	15.50	10.50	6.10	2.00	0	0	0	0	0	0	0
132	136	16.30	11.30	6.80	2.60	0	0	0	0	0	0	0
136	140	17.10	12.10	7.50	3.20	0	0	0	0	0	0	0
140	144	17.90	12.90	8.10	3.90	.20	0	0	0	0	0	0
144	148	18.70	13.70	8.80	4.60	.80	0	0	0	0	0	0
148	152	19.50	14.50	9.50	5.30	1.30	0	0	0	0	0	0
152	156	20.30	15.30	10.30	5.90	1.90	0	0	0	0	0	0
156	160	21.10	16.10	11.10	6.60	2.50	0	0	0	0	0	0
160	164	21.90	16.90	11.90	7.30	3.00	0	0	0	0	0	0
164	168	22.70	17.70	12.70	8.00	3.70	.10	0	0	0	0	0
168	172	23.50	18.50	13.50	8.70	4.40	.60	0	0	0	0	0
172	176	24.30	19.30	14.30	9.30	5.10	1.20	0	0	0	0	0
176	180	25.10	20.10	15.10	10.10	5.80	1.80	0	0	0	0	0
180	184	25.90	20.90	15.90	10.90	6.40	2.30	0	0	0	0	0
184	188	26.70	21.70	16.70	11.70	7.10	2.90	0	0	0	0	0
188	192	27.50	22.50	17.50	12.50	7.80	3.60	0	0	0	0	0
192	196	28.30	23.30	18.30	13.30	8.50	4.20	.50	0	0	0	0

FEDERAL TAX WITHHOLDING

SINGLE Persons -- BIWEEKLY Payroll Period -- Continued

And the wages are—		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$196	$200	$29.10	$24.10	$19.10	$14.10	$9.20	$4.90	$1.10	$0	$0	$0	$0
200	210	30.40	25.50	20.50	15.50	10.50	6.10	2.00	0	0	0	0
210	220	32.20	27.50	22.50	17.50	12.50	7.80	3.60	0	0	0	0
220	230	34.00	29.50	24.50	19.50	14.50	9.50	5.30	1.30	0	0	0
230	240	35.80	31.30	26.50	21.50	16.50	11.50	7.00	2.70	0	0	0
240	250	37.60	33.10	28.50	23.50	18.50	13.50	8.70	4.40	.60	0	0
250	260	39.40	34.90	30.40	25.50	20.50	15.50	10.50	6.10	2.00	0	0
260	270	41.20	36.70	32.20	27.50	22.50	17.50	12.50	7.80	3.60	0	0
270	280	43.20	38.50	34.00	29.50	24.50	19.50	14.50	9.50	5.30	1.30	0
280	290	45.30	40.30	35.80	31.30	26.50	21.50	16.50	11.50	7.00	2.70	0
290	300	47.40	42.10	37.60	33.10	28.50	23.50	18.50	13.50	8.70	4.40	.60
300	320	50.50	45.30	40.30	35.80	31.30	26.50	21.50	16.50	11.50	7.00	2.70
320	340	54.70	49.50	44.20	39.40	34.90	30.40	25.50	20.50	15.50	10.50	6.10
340	360	58.90	53.70	48.40	43.20	38.50	34.00	29.50	24.50	19.50	14.50	9.50
360	380	63.10	57.90	52.60	47.40	42.10	37.60	33.10	28.50	23.50	18.50	13.50
380	400	67.30	62.10	56.80	51.60	46.30	41.20	36.70	32.20	27.50	22.50	17.50
400	420	71.50	66.30	61.00	55.80	50.50	45.30	40.30	35.80	31.30	26.50	21.50
420	440	75.90	70.50	65.20	60.00	54.70	49.50	44.20	39.40	34.90	30.40	25.50
440	460	80.70	74.70	69.40	64.20	58.90	53.70	48.40	43.20	38.50	34.00	29.50
460	480	85.50	79.50	73.60	68.40	63.10	57.90	52.60	47.40	42.10	37.60	33.10
480	500	90.30	84.30	78.30	72.60	67.30	62.10	56.80	51.60	46.30	41.20	36.70
500	520	95.10	89.10	83.10	77.10	71.50	66.30	61.00	55.80	50.50	45.30	40.30
520	540	99.90	93.90	87.90	81.90	75.90	70.50	65.20	60.00	54.70	49.50	44.20
540	560	104.70	98.70	92.70	86.70	80.70	74.70	69.40	64.20	58.90	53.70	48.40
560	580	109.50	103.50	97.50	91.50	85.50	79.50	73.60	68.40	63.10	57.90	52.60
580	600	114.30	108.30	102.30	96.30	90.30	84.30	78.30	72.60	67.30	62.10	56.80
600	620	119.10	113.10	107.10	101.10	95.10	89.10	83.10	77.10	71.50	66.30	61.00
620	640	123.90	117.90	111.90	105.90	99.90	93.90	87.90	81.90	75.90	70.50	65.20
640	660	128.70	122.70	116.70	110.70	104.70	98.70	92.70	86.70	80.70	74.70	69.40
660	680	133.50	127.50	121.50	115.50	109.50	103.50	97.50	91.50	85.50	79.50	73.60
680	700	138.30	132.30	126.30	120.30	114.30	108.30	102.30	96.30	90.30	84.30	78.30
700	720	143.10	137.10	131.10	125.10	119.10	113.10	107.10	101.10	95.10	89.10	83.10

MINNESOTA INCOME TAX WITHHOLDING TABLES

If the payroll period is BIWEEKLY:

And the wages are—		And the number of withholding exemptions is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$ 0	$ 20	$ .10	$ .00	$ .00	$ .00	$ .00	$ .00	$ .00	$ .00	$ .00	$ .00	$ .00
20	28	.30	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	44	.60	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	52	.80	.10	.00	.00	.00	.00	.00	.00	.00	.00	.00
52	56	.90	.20	.00	.00	.00	.00	.00	.00	.00	.00	.00
56	58	1.00	.30	.00	.00	.00	.00	.00	.00	.00	.00	.00
58	60	1.00	.40	.00	.00	.00	.00	.00	.00	.00	.00	.00
60	62	1.10	.40	.00	.00	.00	.00	.00	.00	.00	.00	.00
62	64	1.10	.50	.00	.00	.00	.00	.00	.00	.00	.00	.00
64	66	1.20	.50	.00	.00	.00	.00	.00	.00	[illegible]	.00	.00
66	68	1.20	.60	.00	.00	.00	.00	.00	.00	[illegible]	.00	.00
68	70	1.30	.60	.00	.00	.00	.00	.00	.00	.00	.00	.00
70	72	1.30	.70	.00	.00	.00	.00	.00	.00	.00	[illegible]	.00
72	74	1.40	.70	.00	.00	.00	.00	.00	.00	.00	.00	.00
74	76	1.40	.80	.10	.00	.00	.00	.00	.00	.00	.00	.00
76	78	1.50	.80	.10	.00	.00	.00	.00	.00	.00	.00	.00
78	80	1.50	.90	.20	.00	.00	.00	.00	.00	.00	[illegible]	.00
80	82	1.60	.90	.20	.00	.00	.00	.00	.00	.00	.00	.00
82	84	1.60	1.00	.30	.00	.00	.00	.00	.00	.00	.00	.00
84	86	1.60	1.00	.40	.00	.00	.00	.00	.00	.00	.00	.00
86	88	1.70	1.10	.40	.00	.00	.00	.00	.00	.00	.00	.00
88	90	1.70	1.10	.50	.00	.00	.00	.00	.00	.00	.00	.00
90	92	1.80	1.20	.60	.00	.00	.00	.00	.00	.00	.00	.00
92	94	1.80	1.30	.70	.00	.00	.00	.00	.00	.00	.00	.00
94	96	1.90	1.30	.80	.10	.00	.00	.00	.00	.00	.00	.00
96	98	2.00	1.40	.80	.20	.00	.00	.00	.00	.00	.00	.00
98	100	2.00	1.50	.90	.20	.00	.00	.00	.00	.00	.00	.00
100	102	2.10	1.60	1.00	.30	.00	.00	.00	.00	.00	.00	.00
102	104	2.20	1.60	1.10	.40	.00	.00	.00	.00	.00	.00	.00
104	106	2.30	1.70	1.20	.50	.00	.00	.00	.00	.00	.00	.00
106	108	2.30	1.80	1.20	.60	.00	.00	.00	.00	.00	.00	.00
108	110	2.40	1.90	1.30	.70	.00	.00	.00	.00	.00	.00	.00
110	112	2.50	2.00	1.40	.80	.10	.00	.00	.00	.00	.00	.00
112	114	2.60	2.00	1.50	.90	.10	.00	.00	.00	.00	.00	.00
114	116	2.60	2.10	1.50	1.00	.20	.00	.00	.00	.00	.00	.00
116	118	2.70	2.20	1.60	1.00	.30	.00	.00	.00	.00	.00	.00
118	120	2.80	2.30	1.70	1.10	.40	.00	.00	.00	.00	.00	.00
120	124	2.90	2.40	1.80	1.20	.50	.00	.00	.00	.00	.00	.00
124	128	3.10	2.50	2.00	1.40	.70	.00	.00	.00	.00	.00	.00
128	132	3.20	2.70	2.10	1.50	.90	.20	.00	.00	.00	.00	.00
132	136	3.40	2.80	2.30	1.70	1.10	.40	.00	.00	.00	.00	.00
136	140	3.50	3.00	2.50	1.90	1.40	.60	.00	.00	.00	.00	.00
140	144	3.70	3.10	2.60	2.10	1.60	.80	.10	.00	.00	.00	.00
144	148	3.80	3.30	2.80	2.30	1.70	1.10	.30	.00	.00	.00	.00

MINNESOTA INCOME TAX WITHHOLDING TABLES

BIWEEKLY payroll period -- Continued

And the wages are—		And the number of withholding exemptions is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of income tax to be withheld shall be—										
$ 148	$ 152	$ 4.00	$ 3.50	$ 3.00	$ 2.50	$ 1.90	$ 1.30	$ .50	$ .00	$ .00	$ .00	$ .00
152	156	4.20	3.70	3.20	2.70	2.10	1.50	.80	.00	.00	.00	.00
156	160	4.40	3.80	3.30	2.80	2.30	1.70	1.00	.20	.00	.00	.00
160	164	4.50	4.00	3.50	3.00	2.50	1.90	1.20	.50	.00	.00	.00
164	168	4.70	4.20	3.70	3.20	2.70	2.10	1.40	.70	.00	.00	.00
168	172	4.90	4.40	3.90	3.40	2.90	2.30	1.60	.90	.20	.00	.00
172	176	5.10	4.60	4.10	3.60	3.00	2.50	1.90	1.10	.40	.00	.00
176	180	5.30	4.70	4.20	3.70	3.20	2.70	2.10	1.40	.70	.00	.00
180	184	5.40	4.90	4.40	3.90	3.50	3.00	2.40	1.60	.90	.20	.00
184	188	5.60	5.10	4.60	4.10	3.70	3.20	2.60	1.90	1.20	.40	.00
188	192	5.80	5.30	4.80	4.40	3.90	3.40	2.90	2.10	1.40	.70	.00
192	196	6.00	5.50	5.00	4.60	4.10	3.60	3.10	2.40	1.70	.90	.20
196	200	6.20	5.70	5.20	4.80	4.30	3.80	3.30	2.60	1.90	1.20	.50
200	210	6.60	6.10	5.60	5.10	4.70	4.20	3.70	3.10	2.40	1.60	.90
210	220	7.10	6.60	6.10	5.70	5.20	4.70	4.20	3.70	3.00	2.30	1.50
220	230	7.60	7.10	6.70	6.20	5.70	5.30	4.80	4.40	3.70	3.00	2.30
230	240	8.10	7.70	7.20	6.70	6.30	5.90	5.50	5.00	4.40	3.70	3.00
240	250	8.70	8.20	7.80	7.30	6.90	6.50	6.00	5.60	5.10	4.40	3.70
250	260	9.30	8.80	8.40	7.90	7.50	7.10	6.60	6.20	5.70	5.10	4.40
260	270	9.90	9.40	9.00	8.50	8.10	7.70	7.20	6.80	6.40	5.90	5.10
270	280	10.50	10.00	9.60	9.10	8.70	8.30	7.80	7.40	7.00	6.50	5.90
280	290	11.10	10.60	10.20	9.80	9.30	8.90	8.40	8.00	7.60	7.10	6.60
290	300	11.70	11.20	10.80	10.40	9.90	9.50	9.00	8.60	8.20	7.70	7.30
300	320	12.60	12.20	11.70	11.30	10.80	10.40	9.90	9.50	9.10	8.70	8.30
320	340	13.80	13.40	12.90	12.50	12.00	11.60	11.20	10.80	10.40	10.00	9.60
340	360	15.00	14.60	14.20	13.80	13.40	13.00	12.60	12.20	11.80	11.40	11.00
360	380	16.30	15.90	15.60	15.20	14.80	14.40	13.90	13.50	13.10	12.70	12.30
380	400	17.60	17.20	16.90	16.50	16.10	15.70	15.30	14.90	14.50	14.10	13.70
400	420	18.90	18.60	18.20	17.90	17.50	17.10	16.70	16.30	15.90	15.50	15.10
420	440	20.20	19.90	19.50	19.20	18.80	18.50	18.10	17.70	17.40	17.00	16.60
440	460	21.50	21.20	20.90	20.60	20.30	20.00	19.60	19.20	18.90	18.50	18.10
460	480	23.00	22.70	22.30	22.00	21.70	21.40	21.10	20.70	20.40	20.00	19.60
480	500	24.40	24.10	23.80	23.50	23.20	22.90	22.60	22.30	21.90	21.50	21.10
500	520	25.90	25.60	25.30	25.00	24.70	24.40	24.10	23.70	23.40	23.00	22.70
520	540	27.30	27.00	26.70	26.40	26.10	25.80	25.50	25.20	24.90	24.50	24.20
540	560	28.80	28.50	28.20	27.90	27.60	27.30	27.00	26.70	26.40	26.10	25.70
560	580	30.20	29.90	29.60	29.30	29.00	28.70	28.40	28.10	27.80	27.50	27.20
580	600	31.60	31.40	31.10	30.80	30.50	30.20	29.90	29.60	29.30	29.00	28.70
600	620	33.00	32.80	32.50	32.30	31.90	31.60	31.40	31.10	30.90	30.60	30.30
620	640	34.50	34.20	34.00	33.70	33.50	33.30	33.00	32.70	32.50	32.20	31.90
640	660	35.90	35.70	35.50	35.30	35.10	34.90	34.60	34.30	34.10	33.80	33.60
660	680	37.50	37.30	37.10	36.90	36.70	36.40	36.20	35.90	35.70	35.40	35.20
680	700	39.10	38.90	38.60	38.40	38.20	38.00	37.80	37.50	37.30	37.00	36.80
700	720	40.60	40.40	40.20	40.00	39.80	39.60	39.40	39.10	38.90	38.60	38.40

CLUSTER ONE -- SALES

Unit 6

Advertising

Throughout high school, Hazel had worked on the school newspaper and her last two years had also helped with the yearbook sales. Her task there was taking care of the different ads found in the book. These ads helped finance the cost of printing the yearbook. This experience proved very helpful when she graduated from high school and was out job hunting. She called different publications and finally was told to come for an interview. As part of that interview, she was given a few questions on math.

1. 10 x 5 = ______________
2. 10 ÷ 5 = ______________
3. 14 x 4/7 = ______________
4. 24 x 3.42 = ______________
5. 15½ x 88¢ = ______________
6. 3½ x 10½ = ______________
7. 10 ÷ 1 3/4 = ______________
8. 36.50 + 1.42 = ______________
9. 10% of 48.50 = ______________
10. 16.80 x 2/3 = ______________

Check with your instructor to see whether or not you should proceed with this unit.

A few days later, Hazel received a call from the Star and Tribune, asking if she was available immediately, as they would like her to begin work right after the weekend. Obviously, she was delighted, so she showed up for work at 7:30 a.m. She had to punch in at 8 a.m., but she knew that arriving a bit early the first day to look over the scene was always advisable.

Hazel found that she would be working in the retail ads section--especially ads concerning clothing stores or clothing departments in larger retail outlets.

In this type of setting, the spacing for the ads sold by the column inch. However, this did not mean an inch of column as regularly understood, as Hazel learned. There were 14 lines to a column inch, and rates were calculated according to the number of column inches. Consequently, an ad running 14 lines long and being one column wide would equal 11._______ column inches. The column width is given first and then the number of column inches. Thus, a 1x3 ad would be 1 column wide and 3 column inches long, or 3x14 = 42 lines long. For practice, she was asked to give the number of lines in the following lay-out:

12. 1 x 4 = ______lines
13. 1 x 2 = ______lines
14. 2 x 3 = ______lines
15. 3 x 16 = _____lines
16. 3 x 2 = ________lines
17. 6 x 8 = ________lines
18. 5 x 2 = ________lines
19. 3 x 10 = _______lines

Next, Hazel was given the rate schedule for clothing store ads:

Morning Tribune	72¢/col. in.
Evening Star	88¢/col. in.
Sunday Tribune	94¢/col. in.
Morning and Evening combined	$1.45/col. in.

In a day's work Hazel had to quote prices for a number of accounts that phoned in orders that would have to be continued for one day at a time.

Stendal's on Nicollet Mall and Tenth Street wanted to run an ad on shoes, selling at 50 percent savings. They had prepared copy that measured five inches by ten inches. She found that a column measured 1 3/4" across and a column inch is 1 3/4" in linear measurement. Hazel knew that the only way to sell ad space was to give the width in columns and length in "column inches."

Consequently on a 5" by 10" ad, she had to determine the number of columns by dividing 5 inches by 1 3/4 inches and found it to be 2 6/7. She had to round it off to the nearest whole column, which would be 3 columns in this case. Then, dividing 10 by 1 3/4, she came out with 5.71, which was 5½, rounded off to the nearest one half. This meant that she would have a 3 x 5½ ad, or 16½ column inches. Running that ad for one day only would cost 16½ x 72¢, or 20.__________ for the Morning Tribune 16½ x 88¢, or 21.__________ for the evening Star, or 16½ x $1.45, 22.__________ for a combined run in both the Tribune and the Star for one day. She saw that this combined rate was a savings of 23.__$______ compared to what it would cost if she added the Tribune and Star rates together.

Hazel could see that she had better bone up on her fractions and decimals if she were to succeed in this job. Here are just a few types of problems that crossed her desk that day. Remember to convert everything into columns and column inches before you try to determine the proper rates.

1. Lane Bryant wanted to run an ad on their dress clearance sale. Their layout was 5" x 7", un for one day in both the Star and Tribune.
No. of columns 24.______ No. of column inches 25.______ Cost 26.________

2. Jackson Graves, on Nicollet Mall, had an ad sized 3½" x 10". This would run for two days in the evening Star only. Cost 27.______

3. Harold wanted to run a 5" x 12" in the Sunday edition and also in both morning and evening papers on Monday. Their cost was 28.______.

4. A 3½" x 10½" ad copy from Young Quinlan was supposed to run for two days in the morning Tribune only. Cost 29.________

Hazel was fortunate that not all of her ads came in linear measurements. Some of the regulars would always give ad copies already converted to the newspaper's measurements of the number of columns and the number of column inches.

She also learned that discounts were given if the same ad would be run for longer periods of time.

Run	Discount
3 days	5%
1 week	10%
2 weeks	15%
1 month (calendar)	20%

Dayton's sent in an ad on a special sale that they were running on men's clothes. It was a 3 x 8 ad, or 3 columns by 8 column inches, and Dayton's wanted the ad run for the length of the sale: two weeks. This ad would be run in both evening and morning editions as well as two Sunday editions.

To find the cost, the ad size would be 3 x 8 = 30.________ col. in.

2 weeks would mean 12 combined editions = 12 x 31.________ x 32.________ = 33.________

2 Sunday editions = 2 x 34.________ x 35.________ = 36.________

Total Cost = 37.________
Discount (15%) = 38.________
Net Cost = 39.________

These were a few of the accounts Hazel had to figure during the course of another day. (Dimensions given are column inches.)

40. Juster's wanted to run a 5 x 7 ad in the morning edition and the Sunday edition. Time of the sale was 5 days (4 days and 1 Sunday). Net cost of the ad to Juster's was ________.

41. The Stable had a three day sale coming up and they asked for 2 x 8 space in both morning and evening editions (no Sunday included).

Cost_____________

42. Sears decided to run a special on summer outfits preseason. The size of the ad was 5 x 5. It would run from April 25 to May 24 (30 days) in evening edition only. (Consider four Sundays in this time period.) Cost_________

43. Mom's Maternity shop has a one-week special (10% discounts, six days, no Sundays) on hostess gowns for pregnant women. They wanted to run the ad (3 x 8½) in both morning and evening editions. Cost __________

44. Tiny Tots Tumble Town bought a 2 x 8 ad to run for three full weeks (but no Sundays) in both morning and evening editions. Cost__________

When Hazel had the clothing store ads rather well mastered, she was told to work on other facets of the advertising business. She was quite happy about this, since the longer she worked with advertising, the more she thought of it as a career.

CLUSTER TWO -- INSURANCE

Unit 1

Insurance Salesman and Adjuster

Life Insurance

Bill's uncle Tom seemed to provide for his family in a way that interested Bill. Obviously, his uncle was putting in long hours, but he seemed to enjoy his job immensely and had sufficient pocket money for all the extra things he wanted to do. By exploring this matter with his uncle, Bill found that insurance salesmen works on a commission basis. The amount of commission would vary considerably, depending on the type of insurance sold and whether an agent would be working for one company or as an independent agent dealing with a number of insurance companies.

The math required for an insurance salesman's job includes statistics, percents, and a knowledge of both interest and mortality tables.

To see whether or not Bill had the knowledge needed to bother looking into an insurance career, his uncle gave him a few problems.

1. .094 x \$42 = ____________
2. \$15 $(1+.5)^2$ = ____________
3. Find the average: 50, 24, 36, 16 = ____________
4. \$10.60 x 5 x .087 = ____________
5. \$5.40 + \$3.82 + \$16.50 = ____________

6. A claim is:

   a. A demand for something thought to be due

   b. The price paid for an insurance policy

   c. The request for pay turned in by a salesman

   d. All of the above

7. An actuary is:
   a. A secretary who concentrates on typing numbers
   b. The table used to set the rates charged for insurance
   c. The person who determines the amount to be paid after a claim is made
   d. A person who estimates rates and premiums
8. The two general categories of insurance are:
   a. Accident and health
   b. Life insurance, property and liability
   c. Automobile and property
   d. Life insurance, accident and health
9. About how many people in the insurance industry are directly involved in selling?
   a. 1,300,000
   b. all of them
   c. 433,000
   d. 866,000

Check with your teacher before proceeding.

Bill found that there were four basic types of life insurance: term, straight life, limited payment life, and endowment policy.

The premiums vary on all of these policies because of the differences in coverage that each of them gives, as well as the particular ages that the customer decides to put the policies into force. Usually premiums are figured according to a set base, often $1,000, and then the values given are multiplied, depending on how much coverage a person wants.

As a life insurance salesman, you would be using tables supplied by the company. For the purposes of this unit, only a few options will be handled, since an insurance agent needs pages of the tables supplied by his company to cover all the available plans.

In calculating annual premiums, the agent must figure in (1) the basic premium and (2) the adjustment factor. Essentially, the basic premium covers the cost of the policy benefits and the adjustment factor covers the annual maintenance expenses incurred by the company, including the cost of collecting premiums.

The premiums are shown per unit of protection, which is $1,000 in these cases. Simply multiply by whatever factor necessary to bring the coverage up to that desired.

To find the total (yearly) premium:

1. Multiply the "Base Policy" annual basic rate by the number of units of protection, and round the result to the nearer cent. If the waiver of premium benefit is to be included, use the "male with w.p." or "female with w.p." rate instead of the "base policy" rate.

2. For each rider (except waiver of premium) multiply the "rider" annual rate by the number of units of rider protection and round the result to the nearer cent. If the waiver of premium benefit is included on the base policy, use the "male with w.p." or "female with w.p." instead of the "rider" rate.

3. Add the premium calculated in (1) and each of the premiums calculated in (2) to get the annual basic premium.

4. If the premium is payable by a method other than annual, multiply the annual basic premium by the appropriate fractional premium factor in the following table, and round the result to the nearer cent.

5. Add the appropriate adjustment factor in the following table to the result from (3) or (4). The result is the total premium payable for the policy.

Premium Payment Method	Fractional Premium Factor	Adjustment Factor per $1,000	Maximum per Policy
Annual	1.00	$6.00	$12.00
Semi-annual	.505	3.30	6.60
Quarterly	.255	1.85	3.70
Monthly	.086	.90	1.80

For a representative situation, you would like to calculate the premium for a participating whole life, male age 20, face amount $10,000, premiums payable annually.

Rates and Values per $1,000 of Face Amount (Male -- 20)
(Female -- 23)

ANNUAL BASIC RATES				PLANS	GUARANTEED Cash Values			TOTAL CASH Value		
Base Policy	Male with w.p.	Female with w.p.	A.D.B. per $1,000		10th yr.	20th yr.	65-M 68-F	10th yr.	20th yr.	65-M 68-F
14.37	14.65	14.79	1.00	Part. whole life	97	243	625	130	370	1499
26.49	26.67	26.76	1.50	20-payment life	209	502	753	263	724	1942
19.86	20.05	20.15	1.00	30-payment life	148	361	753	186	521	1801
48.38	48.63	48.76	1.00	20-year endow.	424	1000	----	517	1408	----
10.34	10.58	10.70	1.00	guar. cost whole life	79	212	588	---	----	----

Annual Basic Premium = 14.37 x 10 = $143.70 (to nearer cent)

Annual Adjustment Factor (max.) 12.00
Total Annual Premium $155.70

Calculate the premiums for the same individual (age 20) under the first four following plans. The individual in number 14 is a 23-year-old woman.

10. Participating whole life, face amount $1,225, waiver of premium, premiums payable annually. __________

11. Guaranteed cost whole life, face amount $2,500, accidental death benefit $2,000, premiums payable monthly. __________

12. 20-year endowment, face amount $7,500, accidental death benefit $15,000, premiums payable quarterly. __________

13. 30-payment life, face amount $20,000, accidental death benefit $50,000, premiums payable monthly. __________

14. Female, 23, 20-payment life, face amount $10,000, payable monthly. __________

To compare, consider the plan for participating whole life for a male who is 40 years old.

27.45	28.26	-----	1.10	--------------------	186	406	504	246	640	868

In addition to the above, which are basically life insurance and a savings plan of some sort, companies also offer term life insurance, which has no cash value for the customer. This is a plan for people who have an investment plan of their own on the side in order to prepare for their future. It has the advantage of allowing a person to have an immediate estate while waiting for his investments to produce an estate in actual cash for him.

As an example of term life insurance, consider five-year term, which is renewable and convertible to whole life, should that suit you later. Though the table on page seven is given for annual basic rates per $1,000 of face amount, the minimum issue allowed is a $5,000 face amount.

In the table on page seven, the age of issue (18 to 49 male, 18 to 52 female), basic policy rates, male and female waiver of premium benefit rates and accidental death benefit rates are shown.

Use this table in computing problems 15 through 18.

Issue Age		Base Policy	Male with W.P.	Female with W.P.	A.D.B. per $1,000
M	F				
	18	3.83		4.13	1.00
	19	3.84		4.14	1.00
	20	3.85		4.15	1.00
18	21	3.86	4.07	4.18	1.00
19	22	3.87	4.08	4.19	1.00
20	23	3.88	4.09	4.20	1.00
21	24	3.90	4.11	4.22	1.00
22	25	3.93	4.14	4.25	1.00
23	26	3.96	4.18	4.29	1.00
24	27	4.00	4.22	4.33	1.00
45	48	9.09	9.63	9.90	1.20
46	49	9.76	10.38	10.69	1.20
47	50	10.52	11.22	11.57	1.20
48	51	11.34	12.15	12.56	1.20
49	52	12.25	13.21	13.69	1.20

Using the above table, determine the amounts for the following situations: (Don't forget the adjustment factors.)

15. Male, 24, with waiver of premium, face value $30,000, with accidental death benefit of $50,000. Figure the monthly premium. __________

16. Female, 19, for a face value of $10,000. Figure the premium needed annually.__________

17. Female, age 48, a minimum policy with both the face value and the accidental death benefit for $5,000. Compute her monthly premium. ____________

18. Male, 49 years old, $10,000 coverage, to be paid annually. Determine the annual premium. ____________

There is much more to insurance selling than just these two situations; but it would be too complicated to discuss all of it here. If anyone is interested in additional information, contact:

INSTITUTE OF LIFE INSURANCE
277 PARK AVENUE
NEW YORK, N. Y. 10017

CLUSTER THREE -- CONSTRUCTION

Unit 1

Carpenter

Hank was taking retail sales and marketing in eleventh grade and was assigned the task of interviewing a worker. Hank's dad was building a new home at the time and Hank decided that as long as he was spending time over at the new house anyway, he would interview a carpenter.

He found that the carpentry business today has changed considerably from what it was 20 years ago. Materials are mostly precut and shaped, with less finishing work than in years past. Today, a single carpenter can get more accomplished than two carpenters in the days when they had to do all the work from scratch. The carpenter told Hank that working with areas, fractions, and ratios is an everyday occurrence.

To check on Hank's ability to do math, the carpenter asked him some questions.

1. How many pieces of 3/8" thick plywood are necessary to make a piece 1½ " thick? ____________
2. How many shelf boards 3½ feet long can be cut from a 16-foot board? ____________
3. A board 6½ feet long is cut to two-thirds of its original length. Find the new length. ____________
4. The length of a lot is 148.6 feet and its width is 48.9 feet. By how much does the length exceed the width? ____________
5. Change 3/8 to a decimal. ____________
6. A house whose outside dimensions are 34 feet x 28 feet covers ______square feet.

7. If a carpenter lays 10½ squares of shingles in 3½ days, how many squares of shingles does he average in a day? ________

The carpenter also asked Hank to find out how many carpenters there are in the nation, 8._____, and how much a carpenter in the Twin Cities could expect to earn per hour, 9._____. While looking up these figures, Hank also discovered that carpenters make up the biggest part of the building trades industry and was a little surprised to discover the wide range of carpentry jobs around. From fine finish work to rough scaffold building, the carpenter is involved in almost all phases of construction. Hank had to go to the local apprenticeship office to find out that a carpenter must be an apprentice for 3½ years and that he would start work at 50 percent of a journeyman's pay.

When Hank came back to the carpenter with this information, the carpenter tried to impress upon Hank the need for accurate mearsurement in this trade. Some of the measurements the carpenter told Hank about are as follows:

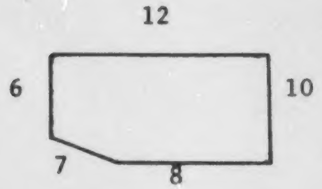
Linear measurement -- the measure of straight line distances. This measurement is used to order standard types of lumber. For example, studs, moulding, rafters, siding, etc., are ordered in "linear" or "running" feet.

Circular measurement -- the measurement of the distance around a circle, in linear terms. The circumference of a circle is the distance around the circle.

Perimeter -- the measurement of the distance around a structure.

Hank then got his math teacher to write up some problems that a carpenter might have to solve.in the day-to-day work that carpenters do. These are the problems his teacher gave him:

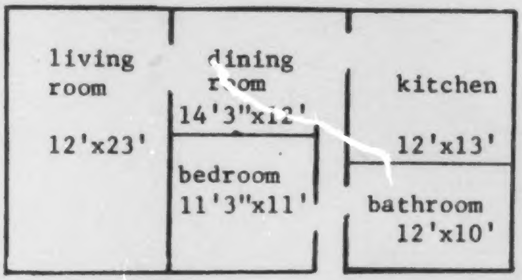
10. What is the perimeter of the figure below?



P = ______________

11. The perimeter, or circumference, of a circle is found by using the formula: Circumference = $2\pi r$. Find the circumference of a circl whose radius is seven inches. C = ____________ ($\pi = 3.14$ or $\frac{22}{7}$)

12. Use the following diagram to answer the problems:


living room
12'x23'
dining room
14'3"x12'
kitchen
12'x13'
bedroom
11'3"x11'
bathroom
12'x10'

a. What is the perimeter of the dining room? P=______________

b. How many linear feet of base moulding are needed for the bedroom (allow 3' for the door opening)? __________

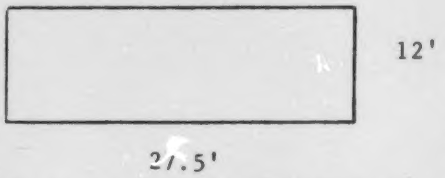
c. What are the length and width of the inside dimensions of the house? L=____________ W=_____________

d. How wide is the hallway between the bedroom and bathroom?______

Area in the carpentry trade is figured in square units. For example, a piece of plywood 1' long and 1' wide is 1 square foot; 1' x 2' is 2 square feet, 1 yard x 1 yard is 1 square yard; etc.

> To find the area of an object, you multiply the length x the width (in common units).

13. Find the area of the following figure:

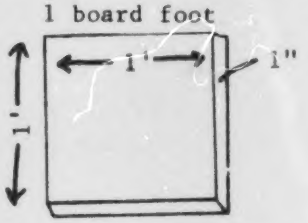


A = ________

14. What is the inside area of the house whose measurements you found in 12 c?________

15. What is the area of a room whose width is 8', length is 9', and height is 7'?________

The measurement of lumber is in board feet. A board foot is the amount of wood contained in a section 1' wide, 1' long, and 1" thick.



To calculate the board measure in any piece of lumber, use the following formula:

$$\text{Board feet} = \frac{T \times W \times L}{12}$$

, where T = thickness (in inches), W = width (in inches), L = length (in feet), and 12 is used to convert inches to feet.

Example: How many board feet are in a piece of lumber 3" x 12" x 20'?

$$\text{bd. ft.} = \frac{3''\times12''\times 20'}{12} = \frac{720}{12} = 60 \text{ bd. ft.}$$

16. How many board feet are in a 1"x2"x12' board?__________

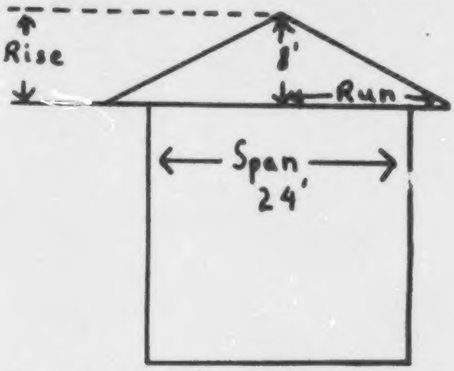
17. How many board feet in a board 2"x4"x16'?_________

18. How many board feet are needed if 240 2x4 studs are needed?______ (Figure each stud is 7'6".)

The pitch of a roof (the amount of slant) is figured by finding the ratio of the rise of the roof to the span of the roof (check accompanying figure). Run = ½ span

$$\text{Pitch} = \frac{\text{rise}}{\text{span}}$$

$$P = \frac{8}{24} = \frac{1}{3} \text{ or } 1{:}3$$



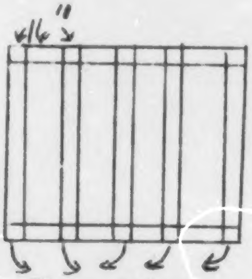
19. What is the pitch of a roof whose rise is 4' and whose run is 4'?

_______ (Remember, run = ½ span.)

20. A carpenter wishes to find the length of a board that will span a garage. He wants the pitch to be 1:4. The rise is 5'. What is the length of the span?_______

21. The addition on a garage has a run of 12' and a rise of 3'. What is the pitch?_________

Floor joists are the 2"x8" or 2"x10" pieces of lumber that span the structure end to end. They are usually spaced 16" apart from the center of one piece to the center of the next piece. See diagram below.



floor joists

A floor is laid over the joists, and the rest of the house is built on this.

22. How many floor joists are needed for a span 24' wide, 30' long and on 16" centers? Draw a diagram of the structure. (Joists will run the width of the house.) Number needed _________ (check answer)

23. If each of the joists in number one is a 2"x10", how many board feet will be in each joist? a._________
In all of the joists needed? b._________

24. If the 2"x10" joists sell for 18 cents a running foot, how much would each of the 24' joists be for problem one? a._________
For all the floor joists? b._________

For additional information and problems, Hank"s math teacher told him to check the book Practical Problems in Mathematics, Carpentry Trades, the local carpenter union, or the local apprenticeship office.

CLUSTER THREE -- CONSTRUCTION

Unit 2

Electrician

Jake was flying home from a trip to visit relatives in Florida and found himself sitting on the plane next to a very friendly man. After take-off, Jake asked the man what he did for a living and discovered that he was an electrician. Being interested in young people, the electrician started telling Jake about his work.

Jake had never thought much about going into a trade but this man's work sounded like fun. He found that becoming an electrician wasn't as easy as he had thought -- it required four years of on-the-job training as an apprentice and he found that it is almost impossible to get into the apprenticeship program without two years of vocational training beyond high school. The second surprise that Jake had was in discovering the degree to which that an electrician works with math.

The electrician asked Jake if he liked to work with formulas and, since he did, gave him some problems to do during the flight.

1. $I = (3) \times (y)$; if $y = 5$, $I =$ ________
2. $J = (3) \times (y) - 4$; if $y = 8$, $J =$ ________
3. $W = (v) \times (a)$; if $v = 115$ and $a = 20$, then $W =$ _______
4. $(3) \times (I) = (5) \times (J)$; if $J = 6$, $I =$ ________
5. $I + J + K = (3) \times (Y) + (4) \times (L) + 32$; if $I = 12$, $K = 2$, $Y = 7$, $L = 2$, then $J =$ _______

Check with your teacher now to take care of any problems.

Jake didn't know what all this had to do with electricity, so he asked the electrician to explain a little bit more about just what electricity is and how one works with it.

"Water is measured in gallons, meat in pounds. Electrical power cannot be weighed on a scale because it is in constant motion. Instead, electricity is measured by how much flows past a point in the electric line at any given moment.

"When we want to measure a quantity of water, we talk of "gallons." When we talk of water in motion, we talk about "gallons per second." With respect to electricity, a unit of electricity in motion is called an ampere.

When air is put under pressure, we speak of pounds of pressure per square inch. Electric power is also under pressure. This pressure is measured in volts. A small radio battery has two volts of pressure, regular house current has 115 volts of electrical pressure. Do you know how many volts a car battery has?

____

Amperes or volts alone do not determine the amount of power flowing in a wire. The two combined do. Watts is the term used to determine the amount of power (amperes and volts) running through a line. Watts = Volts x Amperes."

The electrician used the example of a rifle. If the speed of a bullet remains constant (volts) but the weight of the bullet varies (amperes), the impact varies. The opposite is also true. If the weight stays constant (amperes) and the speed changes (volts), the impact varies.

When Jake got home he went to a book on electricity and found the following problems that he worked. It was tougher than he thought it would be.

6. Two 115 volt lines (plus a neutral wire) run into every house. If each one of them has a 30 ampere capacity, how many watts of power are on one line? Answer: W = Volts x Amperes
W = 115 x 30 = 3450

How many watts of power would the whole house have available?_____

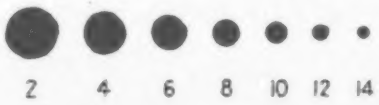
7. Two 115 volt lines enter a house. Each line has a 60 ampere capacity. What is the total wattage available for this house?_____

8. If the house in number two has each line increased to 100 amperes each, the total wattage for this house is increased to________.

When current flows through wire, it creates a certain amount of heat. The greater the amperage, the greater the heat. (Doubling the amperes without changing the wire size increases the amount of heat by four times.) By increasing the wire size, you increase its capacity for amperes because of less heat buildup. By pushing too many amperes through a wire, a fire could start.

Check the following sizes and corresponding chart for amperage capacity. Helpful variations of the W = V x A formula are $A = \frac{W}{V}$, $V = \frac{W}{A}$.

Wire size	Ampere capacity
14	15
12	20
10	30
8	45
6	65
4	85
2	115



9. What size wire would be required for a 100 ampere service to a house?__________

10. From the service box in the basement to a 115 volt appliance using 2,000 watts, a number____wire or larger is needed. (Hint: Use the variation $A = \frac{W}{V}$ to determine the number of amperes used by the appliance, then check the table.)

Watts Consumed by Common Appliances

The following table summarizes the wattage necessary to run common appliances. Read it carefully, remembering what a watt is.

	Watts
Lamps, incandescent	10 upward
Lamps, fluorescent	15 to 60
Lights, Christmas tree	30 to 150
Clock	2 to 3
Radio	40 to 150
Television	200 to 400
Sun-lamp (ultra-violet)	275 to 400
Heat lamp (infra-red)	250
Heating pad	50 to 75
Blanket, electric	150 to 200
Razor	8 to 12
Heater, portable, household	1,000 to 1,500
Heater, wall type, permanently installed	1,000 to 2,300
Fan, portable	50 to 200
Air conditioner, room type	800 to 1,500
Hair dryer	250
Projector, slide or movie	300 to 500
Sewing machine	60 to 90
Vacuum cleaner	250 to 800
Refrigerator, household	150 to 300
Freezer, household	300 to 500
Iron, hand (steam or dry)	660 to 1,200
Hot plate, per burner	600 to 1,000

	Watts
Range (all burners and oven "on")	8,000 to 14,000
Range top (separate)	4,000 to 6,000
Range oven (separate)	4,000 to 5,000
Toaster	500 to 1,200
Coffee maker (percolator)	800 to 1,000
Waffle iron	600 to 1,000
Roaster	1,200 to 1,650
Rotisserie (broiler)	1,200 to 1,650
Fryer, deep-fat	1,200 to 1,650
Frying pan	1,000 to 1,200
Blender, food	500 to 1,000
Knife, electric	100
Food mixer	120 to 250
Dish washer	1,200 to 1,800
Garbage disposal unit	500 to 800
Washing machine	350 to 550
Washer, automatic	600 to 800
Dryer, clothes	4,000 to 5,000
Water heaters	2,000 to 5,000
Motors: ¼-hp	300 to 400
½-hp	450 to 600
Over ½-hp., per hp.	950 to 1,000

Answer the following questions using the table of common appliances and the table of common wire size.

11. How many amperes are used if a fan, frying pan, and ½ H.P. motor are running? Assume all are on 115 volts and the wattage used is the lowest amount shown in the table. a.__________

Answer:

fan --	50	watts
frying pan --	1000	watts
½ H.P. --	450	watts
	1500	watts total

$$\text{Amperes} = \frac{W}{V} = \frac{1500}{115} = 13 \text{ amperes}$$

What is the smallest size wire necessary to carry this load? b.__________

12. A new circuit is to be added to the fuse box in the basement. This circuit will service a refrigerator, room air conditioner, toaster, and food blender. Assume all are 115 volts and use the least amount of wattage listed in the table.

How many watts will be demanded if all the appliances are on at once? a.__________

How many amperes will be demanded? b.__________

What size is the smallest wire that will safely carry this load?

c.__________

13. A number 14 wire is servicing six outlets. If an automatic washing machine, television, and air conditioner are on this circuit already, can a coffee maker be added? a.__________ Why? b.____________
(Assume lowest wattage in table and 115 volt circuit.)

14. A separate circuit had to be installed for a large 18,000 B.T.U. air conditioner. It requires 230 volts. So two 115 volt lines were run to it (along with the neutral wire). The amperage rating on the air conditioner is 13.5. What is the wattage used by the machine? a.__________ What size wire is needed for the run? b.__________

15. When planning the size of service (number of amperes) for a new home, an electrician can go by a "rule of thumb." If this rule is 6 outlets per 250 square feet, find the number of outlets needed in a home whose first floor is 25' x 30' and second floor is 23' x 25'.________________

Jake had grown to respect the math knowledge required of an electrician. He now felt that the $8 an hour which they received was reasonable and really became excited about better preparing himself for this line of work. He spent some time in the library, looked into programs in the vocational - technical schools, and even bought a book, Wiring Simplified by H. P. Richter. The local apprenticeship office at 917 Plymouth Avenue (phone 529-9121) also gave him some information.

CLUSTER THREE -- CONSTRUCTION

Unit 3

Plumbing

After graduating from high school, Jack found that he still faced one major problem: "What should I do for a job?" Jack had had many part time jobs but he now felt that the time had come to look into a full time job with a future. Although he had some interest in becoming a plumber, he'd never really taken the time to dig out information on this work.

Jack had heard from friends at school that the plumbing trades had to be entered through specific channels; to find out just what these channels were, he went to see his counselor. Jack's counselor felt that he should go to a better source for this information -- the apprenticeship information office.

After talking to the director of the apprenticeship office, he found that the trade usually puts out calls for apprentices, generally between May and September, depending on how many are needed. Applicants take form one of the General Army Classification Test and must attain a preset cut off score. Next the applicant is interviewed by the apprenticeship committee, which consists of three representatives of plumbing companies and three representatives of the plumbers union. If the committee accepts the goals, pre-education, and other things they feel necessary, the applicant is enrolled in a three-month, 75-hour pre-apprenticeship program. The prospective plumbers meet two nights a week at Dunwoody and are given extensive work in math, use of equipment, and other skills. The instructor gives the written tests, one each month. These three scores, along with a grade on reports and a grade on homework, give the instructor five grades to rank the enrollees. The highest scorers are indentured (put on a contract) with various plumbing contractors to meet the 8,000-hour (usually five years) comprehensive training program.

Jack's idea that a man goes directly to a job and starts work was completely changed. He found that the trades are demanding more of their men than ever before.

He felt he needed a little more information on the pre-apprenticeship program offered at Dunwoody; he went to the institute and met Mr. Swedlund, the instructor of the program. To give Jack an idea of how the course is run, Mr. Swedlund gave him the initial test given all prospective plumbers. The following problems are similar to those on the pretest. Try these problems and check your answers with your teacher.

1. 38 + 45 + 87 =

2. $$\begin{array}{r}39.5\\47.8\\33.3\\\underline{15.4}\end{array}$$

3. 39.7 - 25.8 =

4. 38.7 x 98.4 =

5. 3/4 x 40 =

6. $35\overline{)534}$

7. 66.5 ÷ 13 =

8. 2/3 ÷ 7 1/3 =

9. 3/8 + 3/2 + 14 =

10. 1/10 of 720 =

11. After working a certain length of time as an apprentice, a person may become_______________.

a. A department manager

b. A shop steward

c. A journeyman

d. A foreman

12. The largest single group in the building trades is _______________.

a. Carpenters

b. Painters

c. Plumbers

d. Bricklayers

After taking the pretest and going over the results, Jack came to the conclusion that his ideas about skilled tradesmen and the background they should have had been wrong. So far he had found out about the apprenticeship program and some of the pre-apprenticeship requirements. He now knew that the math needed and taught is of a general value and the related math is taught on the job. He decided to visit a plumber on the job and set up the visit through his teacher, who helped him make a contact with a union representative.

Jack found that it didn't take too long for his meeting with a plumber to be set up, for he received a call from Mr. Swedlund, who told him that Jeff Wilexski agreed to pick him up at Dunwoody at 8 a.m. the following Monday. Mr. Wilexski would be making his rounds, mainly pricing jobs he had, so Jack could see how he went about it.

Mr. Wilexski turned out to be a rather pleasant fellow. He explained to Jack that most of the skills he needed would be learned on the job. Pricing a job, however was always necessary so that the customer would have an idea of how big a job the repair work would be.

Between stops, Mr. Wilexski gave Jack a few of his more recent math situations and job pricings to calculate.

13. If a pipe is to be installed that must have a 1" rise for every 20 feet in length, what is the difference in height of the ends of the pipe if the pipe is 150'? ____________

14. Raw copper is selling for 8½ cents per pound. 250 pounds would cost ________.

15. One pint of plastic adhesive will cement 16 joints of 3" pipe, or 22 joints of 2" pipe, or 28 joints of 1" pipe. How many pints of adhesive are necessary for a job requiring 40-3" joints, 11 joints of 2" pipe, and 140-1" joints? _______

16. A plumber was "pricing out" a job. He determined he would need 60' of 3/4 inch copper tubing, 80' of ½" copper, 7--3/4" 90° elbows, 18--½" elbows, 3--3/4" connectors, 4--½"connectors, 1--3/4" to ½" reducer, 2--3/4" tees, 4--½" tees, 5 lbs. of solder. He believes it will take 10 hours of work to complete the job at $7.61 per hour.

TABLE OF PRICES	
3/4" copper pipe	35¢ foot
½" copper pipe	20¢ foot
3/4" 90° elbow	16¢ each
½" 90° elbow	12¢ each
3/4" connector	13¢ each
½" connector	9¢ each
reducers	18¢
3/4" tees	17¢
½" tees	14¢
solder	25¢ lb.
3/4" 45° elbow	11¢
½" 45° elbow	8¢

a. What will the total bill come to for material? (Don't forget to add 3% sales tax.)______________

b. The charge for labor will be ___________.

c. The total bill for the job will be_____________.

17. Use the information from number 14 to determine the material price and labor for this job.

80' of 3/4" copper a. ____________
120' of ½" copper b. ____________
10--3/4" 90° elbows c. ____________
12--½" 90° elbows d. ____________
2--½" 45° elbows e. ____________
9--½" connectors f. ____________
2 reducers g. ____________
8 pounds solder h. ____________
4 faucets @ $12.50 each i. ____________
2 sinks @ $25.50 each j. ____________
1 lavatory @ $54 k. ____________

Total materials l. ________
3% Sales Tax m. ________
Total goods n. ________
22 hours of labor @ $7.61 o. ________
Total job cost p. ________

Jack thought to himself: "There's more to this than meets the eye!" He was enthusiastic about what he saw, though, and was more convinced than ever that he wanted to be a plumber. Of course, it would be a few years before he could call himself a full-fledged plumber. He eagerly reported to Mr. Swedlund to continue his training.

CLUSTER THREE -- CONSTRUCTION

Unit 4

Operating Engineer (Heavy Equipment)

It was kind of fun watching the backhoe dig up his front yard, at least to Jim it was. His folks weren't too happy to have to pay the cost of hooking up to the city sewer, but their septic tank had again given them problems, so they had decided to do it. It looked as though there were at least 20 different levers and controls on that machine -- a machine that Jim hadn't even realized was called a backhoe before today. He had always thought it was just a tractor with a long scoop mounted on the back.

During the operator's lunch break, Jim had talked to him and found out that he could also operate graders, draglines, cranes, and even bulldozers. The operator had learned how to do this at the Staples Vocational School in a course called heavy equipment operation that lasted for 21 months. Jim was told that many operators don't go to school; rather, they register with the union and get placed on a job when one is available. They usually start as an oiler -- a helper for the operator, and work up to the $6.90 to $7.50 per hour pay that the full operator receives.

Jim had asked if there were any special requirements to becoming an equipment operator and had learned that high mechanical aptitude and good physical ability, of course, were required. Jim remembered the high score he had received on the mechanical aptitude section of a test he had taken in ninth grade. The operator went on to tell him that the math he had in the classroom part of the course at the Staples School was the hardest part for him. Most of these problems were on-the-job kinds of problems and he gave Jim some examples.

In order to put in the basement of a new house, the contractor had to hire an excavating company to dig a hole the dimension of the basement and haul the dirt away. The house was to be 40' long and 20' wide. To allow room for workers, three feet were to be taken out on each side. The hole was to be 15 feet deep.

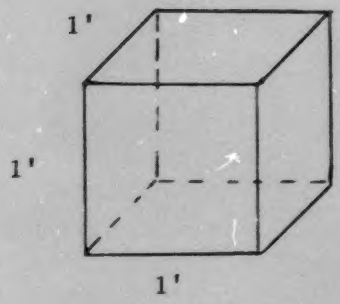
1. Draw a diagram of the area to be dug out, one a top view (showing area of base as well as extra area for workers) and a front view (showing length and depth). Do these very carefully, using a ruler.

2. Using the formula area = length x width (A = L x W).

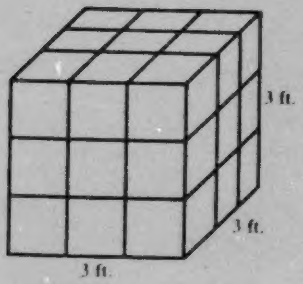
   a. Find the area of the house. __________ Length and width must be in terms of the same units, as feet, yards, etc. Area is always given in square units; i.e., square feet and square yards.

   b. Give the area of the hole to be dug ________ (includes extra area)

3. To determine the amount of dirt to be removed, we must include a third dimension -- that of depth. "Cubic" is the term used to measure volume.



The diagram is a picture of a block with dimensions of length = 1', width = 1', and depth = 1'. This would be a picture of a block one cubic foot in volume.



1 cubic yard

This diagram is of one cubic yard.

   a. How many cubic feet are in a cubic yard? _____________

   b. The formula for volume would be V = length x width x _____.

c. Returning to the basement problem, how many cubic feet of dirt will have to be removed for this basement (use volume = length x width x depth, V = L x W x D)? ____________

v = __________ ft. x _________ ft. x ___________ ft. = _________ cubic feet

d. How many cubic yards would this represent? ______________

At this point, check all answers with your teacher. When all questions are cleared up, proceed.

4. The number of cubic yards to be removed from the basement referred to in problem one is a.__________ . Round this off to the nearest whole cubic yard. b.____________

A front end loader (a scoop shovel) is used to remove the dirt. It can scoop 3/4 of a cubic yard of dirt out each time. How many scoops are necessary to remove all of the dirt? c.___________

The excavating company had three dump trucks to haul the dirt away. If each one can haul six cubic yards, how many loads will be necessary to carry all the dirt away? d._____________

If it takes 20 minutes to load one truck, how many hours will the whole job take? e.____________

5. Find the volume of dirt to be removed for a basement whose dimensions are 26' x 35' x 18' (l,w,d). ____________ (Don't forget work area.)

6. Find the volume of dirt to be removed for a basement 35 ft. x 6 yds. x 14.5 ft. ____________ (Don't forget work area.)

7. A crane can remove 2/3 of a cubic yard of debris from a wrecked building in each scoop. If the operator makes 72 scoops per day, how many cubic yards of debris will be removed?___ ________

8. A contractor is pouring cement on the third floor of a new building. The most economical way to get the cement there is to attach a cement bucket to a crane and have it deliver the cement. If the bucket holds 1 1/3 cubic yards of cement, how many trips must the crane make to pour a floor 105 ft. x 55 ft. x 6 in.? ____________

If you wish more information on this occupation, check the materials available in class or from the counseling department. You can find a short explanation of the job in the Encyclopedia of Careers as well as obtain a brochure from the Staples Area Vocational-Technical School.

CLUSTER THREE -- CONSTRUCTION

Unit 5

Surveyor

One noon during lunch, Chuck started talking to his friend about summer jobs. They were sitting in the cafeteria and Chuck had been wondering what he was going to do during the summer months. He hadn't worked previous summers, but now he needed some extra money for his senior year.

His buddy told Chuck to check into getting a job as a rodman with a surveying crew. That was the job he had, and the money wasn't too bad. Chuck asked his friend to tell more about it, especially how to get a job like that.

He found out that a rodman has the job of holding the pole and thus assists in measuring the height or distance or direction that a surveyor is working. Chuck was told that most of the jobs like this are with a government agency (county, city, or state) and the surveying crew is "laying out" roads, etc.

Chuck was concerned about the fact that he didn't know much about surveying and would have to be taught everything; his friend said that he had been in the same situation and had been taught on the job. This summer Chuck's buddy was going to be a chainman -- measuring distances, instead of holding the pole.

Chuck talked further and found that many people become surveyors after starting as rod or chainmen. Others go to a trade school for one and one-half years and get training in something like highway engineering. Many surveyors go to work for a government agency at a salary of about $670 with increases determined by experience and examination results. Private firms negotiate wages depending on need, experience, schooling, and other factors.

As in most careers, surveying has its specialty fields. A land surveyor works mainly with establishing property lines. A highway surveyor establishes where the highway will go, its curves, grades, and drainage. A pipeline surveyor determines right-of-way for oil and gas pipelines.

Two very important areas of this work were also talked about by Chuck's friend. They were the instruments used and the math needed for this work. Chuck asked why math was so important and his friend gave him some examples.

1. A grade of four inches per 100 feet is necessary on a highway for proper drainage. This means a four inch drop for every 100 feet of highway is required.

   a. What is the amount of drop necessary from the beginning of a one mile stretch to the end, using the four-inch to 100-feet rule (1 mile = 5280 ft.)? (Give your answer in feet.) __________

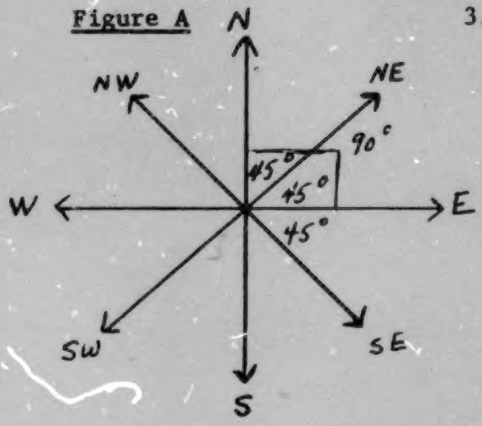
   b. A four-block stretch of road is going to start and stop at the same height. In order to get the proper drainage, make a drawing of the road. (1 block = 1/12 mile) Your drawing should show a common drainage spot at the middle of the four-block stretch. The two ends should be at the same height.

   c. How much of a drop, in inches, will there be from the beginning to the drainage spot? _________

Surveyors must be able to read blueprints for their everyday work. A blueprint is a scaled drawing of the project. The scale, that is the unit of measure to be used on the blueprint for each actual unit of measure of the project, is determined by the size of the project and the desired size of the paper the blueprint is on. For example, a rectangular plot 10' by 8' could be scaled down to 10" by 8" on a blueprint by representing 1' of actual measurement to 1" on the drawing. The scale would be 1" = 1'. This would require a rather small piece of paper to represent the actual lot. If the scale was 4" = 1', the blueprint would be 40" x 32" and would require a rather large piece of paper. Another plot of land was 150' by 75'. If the scale is 1" = 25', the scaled drawing would be 2.____________. The next two problems make use of scaled drawings. You must use a ruler to get the proper scale.

Mr. Jacobsen hired a surveying firm to plot a piece of property he wished to buy. They staked out the property and sent a written explanation of their work. Use a ruler, 1" = 100', to draw a picture of his property using the written description they sent.

Figure A



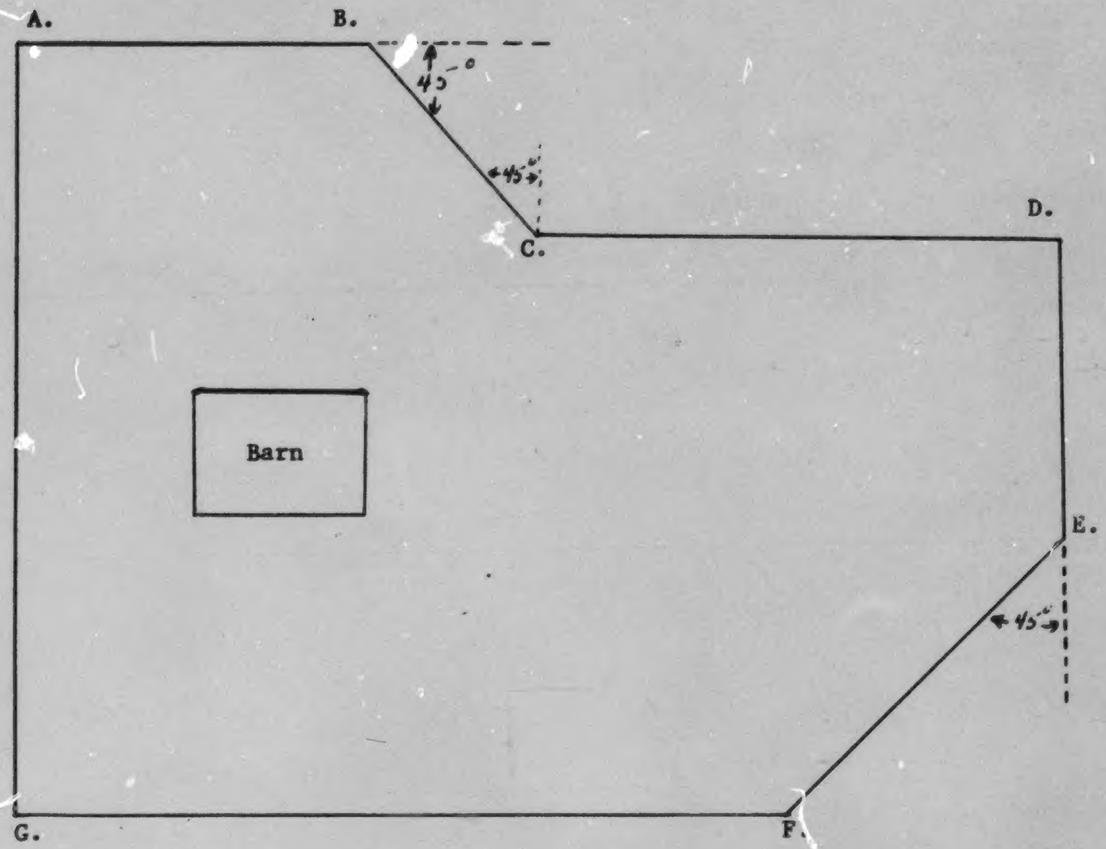
3. Use figure A as a reference to plot the following example.

The description starts at the northwest corner of the property. From there, the property extends 350' due east, then 225' southeast, then 275' south, then 200' northwest, then 200' southwest, then 150' due west. Plot these points very carefully. Then determine the distance from the starting point to the last point you plotted. This distance is a.____________. The approximate direction from the last point to the original point is b.____________. (Remember 1" = 100')

Starting point:

Northwest corner

4. The scale drawing below is in the ratio of 1" of drawing to 100' of actual distance.


A.
B.
45°
45°
C.
D.
Barn
E.
45°
G.
F.

a. Give a description of this property starting from point A and going clockwise.

b. Find the dimensions of the barn.__________________.

Using two measurements, describe how to find the northwest corner of the barn

from point A c.____________

from point G d.__________

After working with these problems, Chuck decided to find out more about this kind of work by visiting the city surveying department, and he decided to apply for a job, too.

CLUSTER FOUR -- MEDICAL AND HEALTH

Unit 1

Laboratory Assistant

" Tom, did you take care of the garbage? If it doesn't fit in the cans, just stomp on it a bit and I'm sure that it'll go in. The garbage collectors aren't going to be by until next Tuesday and I don't want to pay for an extra container."

Tom couldn't help but wonder what the attitude of his supervisor would be if he would handle the tasks that he had at work in the same manner. He worked as a lab assistant for Dale Reese Unity Group, Inc. The degree of precision required for his work was much more than that needed to "pack" a garbage can. For one thing, Tom had to be very familiar with conversion tables so that he could go easily from metric to English measure with no problems.

METRIC UNITS OF MEASURE AND ENGLISH EQUIVALENTS

1 millimeter (mm) = ...(about 1/25") 0.03937079"
10 millimeters = 1 Centimeter (cm) = ...0.3937079"
10 centimeters = 1 Decimeter (dm) = ...3.937079"
10 decimeters = 1 Meter (m) = ...39.37079"
or 3.2808992 feet, or 1.09361 yards
10 meters = 1 Decameter (dkm) = ... 32.808992 feet
10 decameters = 1 Hectometer (hm) = ...109.36 yards
10 Hectometers = 1 Kilometer (km) = ...0.6213824 mile
10 kilometers = 1 Myriameter (mm) = ...6.213824 miles
1 inch = ...25.4 mm or 2.54 cm
1 foot = ...304.8 mm or .3048 m
1 yard = ...91.14 cm or .9114 m
1 mile = ...1.609 km
1 square centimeter (sq cm or cm^2)..............155 sq. in.
1 square inch = ...6.452 sq. cm.
1 cubic inch = ...16.393 cu. cm.
1 cubic centimeter (cucm, cc, or cm^3).............061 cu. in.
1 cubic decimeter = ...61.023 cu. in. or .0353 cu. ft.
1 liter (l) = ...1 cu. dm. or 61.023 cu. in.
1 cubic foot = ...28.317 l
1 gallon = ...3.785 l
1 kilogram (kg) = ...2.2046 lbs.
1 pound = ...4536 kg.

After some time on the job, Tom had practically memorized the table shown here. He hadn't really made an effort to do so, but constant referring to the conversion units given ended with his knowing the more important ones. The most important factor in his work was exactness. Whatever analysis Tom ran, major decisions affecting a person's health would be made on the basis of those findings. Consequently, sloppiness could cause not only discomfort but very probably serious complications to the person concerned.

Tom explained that a large portion of his work involved the use of ratios in determining solutions and other comparisons. For instance, in trying to determine the tissue density for a patient, Tom knows that a 200 milligram piece of tissue, usually called a tissue standard, has a five percent optical density. This means that a section of skin weighing 200 milligrams is translucent to the point of allowing five percent of the light to go through the tissue. In order to find the density or weight (loosely speaking) of a tissue sample, Tom would determine the amount of light able to show through, and then work a simple ratio.

The density of a tissue sample showing seven percent would be found by:

$$\frac{200 \text{ (milligram standard)}}{.05 \text{ (optical density)}} = \frac{X}{.07}$$

$$\frac{.07 \times 200}{.05} = X$$

$$280 = X$$

For a few examples of this type of ratio, find the mass, in milligrams, of the following:

	Optical Density	Tissue Density
1.	8%	______
2.	4%	______
3.	5.6%	______
4.	3.4%	______
5.	5.1%	______

Another area in which Tom needed to be proficient was preparing normal solutions. A normal solution (1N) contains one gram-equivalent weight of solute per liter of solution. A gram-equivalent weight means the molecular weight or formula weight of a compound divided by its valence.

With that information, Tom was able to prepare a 0.1N solution of H_2SO_4, which had a molecular weight of 98 grams and a valence of 2. He figured that 98g. ÷ 2 = 6.__________. That meant that he would need 7._________ of H_2SO_4 to make a 1N solution. But, he wanted a 0.1N solution, so he would need 8._________ x .1 = 9._________ grams of H_2SO_4. Tom added sufficient water to have a total volume of one liter. This gave him a 0.1N solution of H_2SO_4.

Some other typical solutions Tom had to prepare were:

a. A 0.5N solution of $Ca_3\ (PO_4)_2$, which has a molecular weight of 310g. and a valence of 6. How many grams of $Ca_3\ (PO_4)_2$ would he need for this solution? 10.___________

b. A 0.1N of HCl, which has a molecular weight of 36.5g. and a total valence of 1. Tom would require how much HCl for a 1 liter volume of solution? 11._________

c. H_2SO_4 has a molecular weight of 98g. and a valence of 2. how much H_2SO_4 will be required to make a 5N solution? 12.___________

* d. If ½ liter of 1N solution of $CuSO_4$ is mixed with ½ a liter of 0.01N solution, the result would be a 13.__________N solution.

* See the chemistry teacher in your school to further investigate this problem.

Tom often had to weigh objects in his work. Because of the precision needed, he used a scale balance where he would place weights on one pan and the substance to be weighed on the other. The weights available to him are:

1 milligram (mg.)
5 milligrams (mg.)
10 mg.
50 mg.
100 mg.
.5 grams (g.)
1 gram (g.) = 1000 milligrams
5 g.
10 g.
50 g.
100 g.
500 g.
1 kilogram = 1000 grams

What weights would Tom need to weigh objects weighing

14. .015 grams ______________
15. 4.189 grams ______________
16. 248.59 grams ______________
17. 46.016 grams ______________
18. 1.489 grams ______________

Tom realized that he had learned much in his job since he first began. But it was his love of being part of the fascinating world of chemistry which first interested him in this work. The work is exciting, the hours may be long, but the personal rewards are high -- and that means a lot.

He felt fortunate to have a job in clean surroundings and with good pay without having had to go to college. His yearly salary of $6,900 was at least as good as some of his friends were getting and Tom was enjoying his work more than some of the others.

CLUSTER FOUR -- MEDICAL AND HEALTH

Unit 2

Ward Secretary

"Why do you want to work in a hospital?" the personnel manager asked Jean.

"I guess I just like helping people, especially the small children in -- oh, I guess it's called pediatrics."

"Do you know much about the job of being a nurse, either aide or L.P.N.?"

"I've a cousin who works here as an aide. She's the one who told me about applying here."

"Would you mind the messy parts of the job, such as handling bed pans and giving baths?"

"Not really, I guess. But I want a job where I can work with people directly, so I know I could get used to the less desirable parts of the job. There are these things in every job."

The personnel manager was pleased with Jean's determination for a job. "We have an opening in pediatrics now, but it's not working directly with children. It's as a ward or floor secretary. The job entails keeping records, charting, and working with the nurses and doctors on the floor. You are working with people all the time."

"That sounds quite interesting. I wouldn't be working directly with any of the patients would I?"

"That's right," replied the personnel manager, "the only connection you would have is with keeping each patient's charts."

Jean and the personnel manager continued to talk for a short time and she was given a short employment placement test. It included some basic math problems like those that follow.

1. Addition

a. $ 1.39
7.56
4.27
18.22

b. $25.96
19.00
10.99
4.86

c. 1,963
17,812
967
1,409

2. Subtraction

a. 7.863
- .974

b. $12.92
- 8.00

c. $23.10
-19.87

3. Multiplication

a. 47
x 63

b. 186
x 92

c. $10.16
x 118

d. 32 x 7/16 = ______

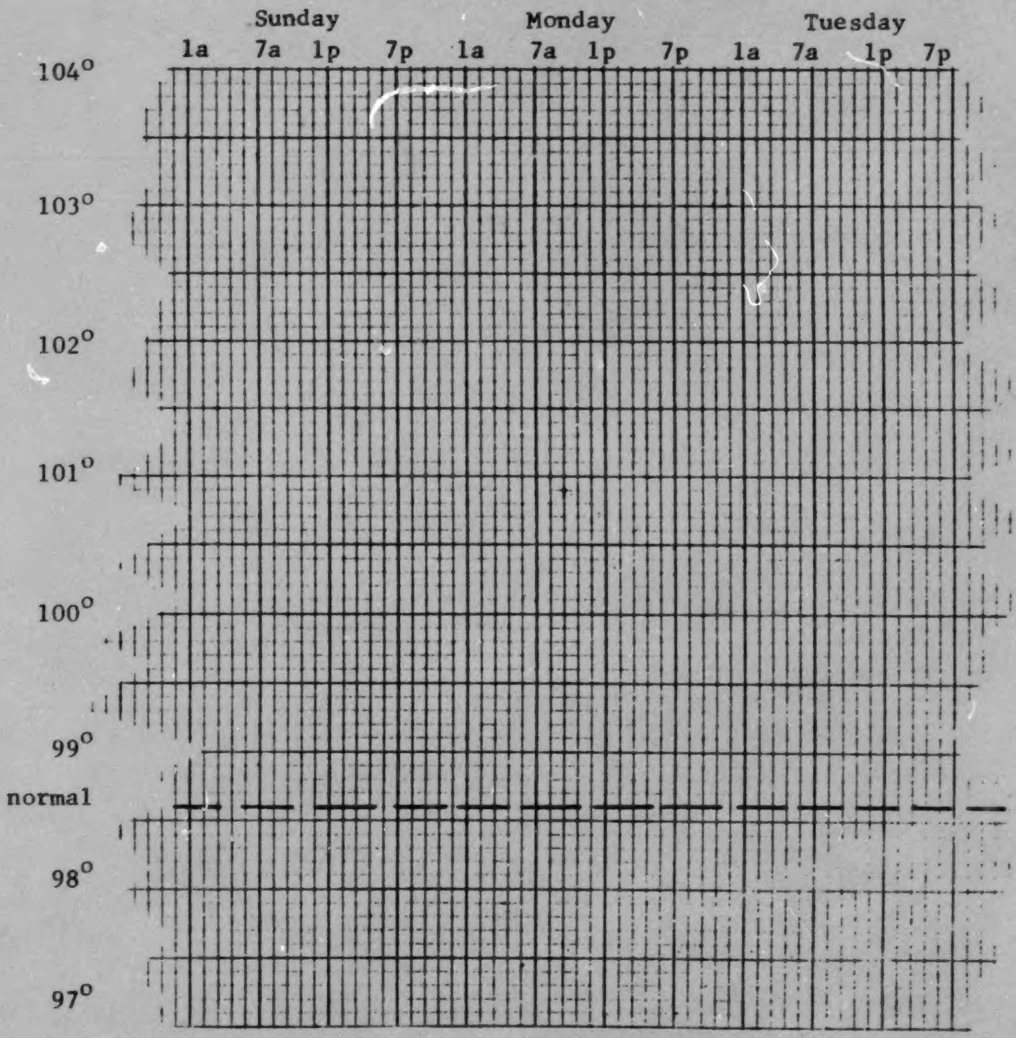
Jean decided that she had done a decent job on the test because the personnel manager called her back in to talk about some specific things about the job.

She found that her salary would be $370 a month, but her hours might not be the same from one week to the next. Her week would be 40 hours, however. She was finally told that she could have the job if she wanted it.

Jean started work the next week at 8 a.m. on Tuesday. Her first job was charting temperatures.

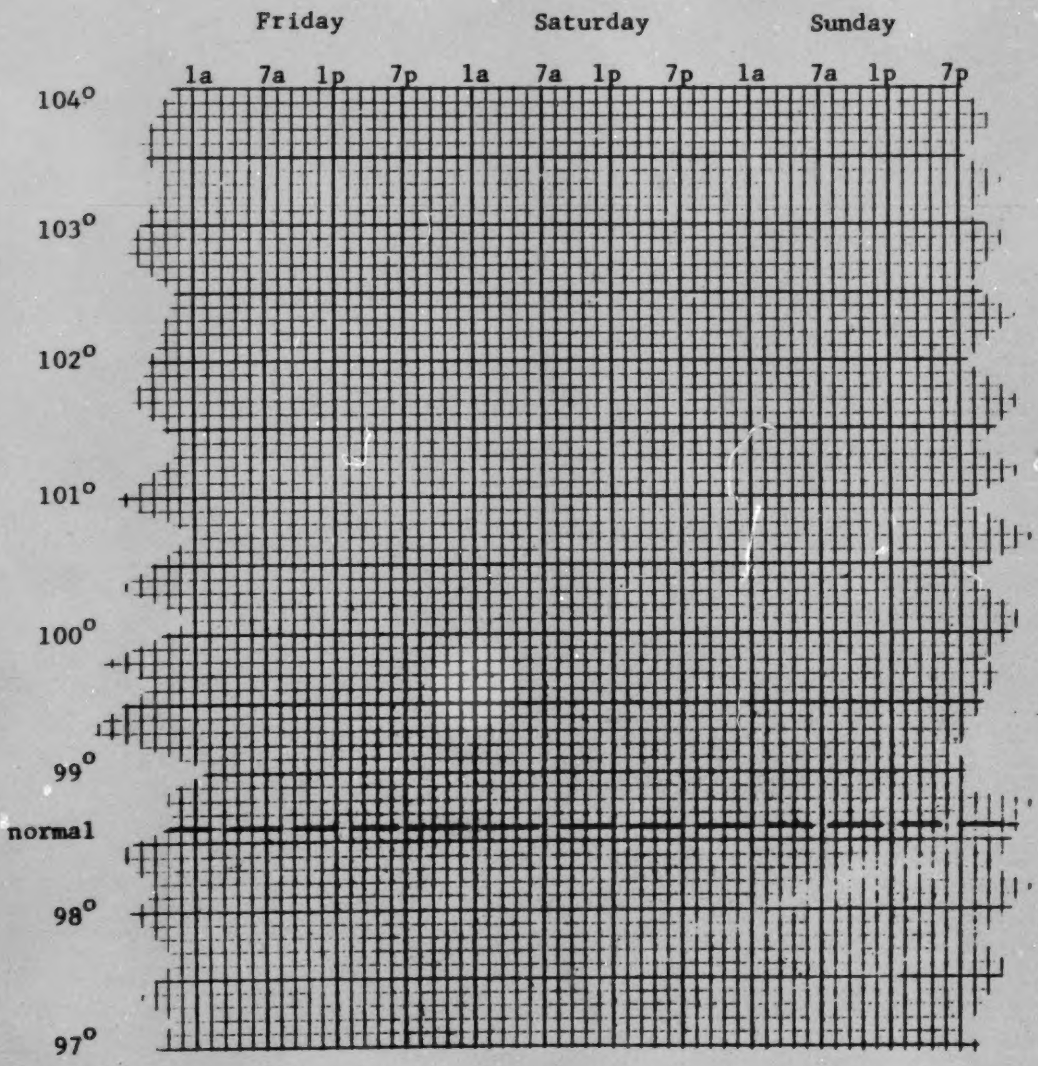
4. Complete the following chart with these readings:

	1 a.m.	7 a.m.	p.m.	7 p.m.
Sunday	99.1	99.0	100.0	100.1
Monday	100.5	100.0	98.8	98.6
Tuesday	98.9			



5. Chart these temperature readings on the following graph:

	1a	7a	1p	7p
Friday	101.2	101.4	102.7	102.6
Saturday	102.5	103.1	103.5	103.0
Sunday	102.0	101.3	99.8	99.1



Jean also had to record the drugs and supplies each patient used. In large hospitals, this is computerized, but in smaller ones, the ward secretary is also responsible for calculating and recording prices.

Find the costs of the following supplies:

5 sterile gauze pads (5x5) @ .28 = 6.__________

1 roll 1¼" tape (non-allergenic) @ .79 = 7.__________

2 rolls 3/4" tape (non-allergenic) @ .59 = 8.__________

2 back lotion @ $1.29 = 9.__________

Total of supplies = 10.__________

Find the costs of the following drugs:

2 type x (pills) @ .25 = 11.__________

1 type a (pill) @ $1.09 = 12.__________

20 c.c. drugs @ .25 per c.c. = 13.__________

15 c.c. drugs @ .89 per c.c. = 14.__________

3 hypodermic syringes (disposable) @ $1.17 = 15.__________

Total of drugs = 16.__________

Jean's job had a lot of detail work, such as lists and special orders. She was responsible for giving visitors directions to rooms of patients.

Her job required her to have a pleasant personality and be neat in appearance. It was a job in which she didn't have to feel pushed -- yet she had some very important tasks to do.

After a week on the job, Jean was pleased that she was a ward secretary. She felt fortunate that she had taken this job and not kept looking for a job as an aide, because she really liked what she was doing.

As Jean looked to her future, she thought about asking if it would be possible to get some time off to take the hospital station secretary course that was offered at the Anoka or the Minneapolis Vocational schools. It was a full 16-week course and Jean thought she would have more opportunity for advancement if she took it.

CLUSTER FOUR -- MEDICAL AND HEALTH

Unit 4-3

Dental Assistant

For the last few weeks Sandi had been bothered by a dull toothache whenever she ate or drank anything quite hot or real cold. Her mother told her to call the dentist and arrange for an appointment for after school. Sandi hadn't been to a dentist in five years and she didn't like the thought of his grinding around on one of her teeth. However, with persistent nagging from her mother, Sandi made an appointment for the next Wednesday at 4:30 p.m.

By the time Wednesday rolled around, Sandi was happy she'd gotten the appointment because the pain was constant now.

While the doctor was fixing her tooth, Sandi noticed a young lady assistant who was doing a lot of different things for the doctor.

"Do you need a lot of schooling to work here?"

"No, I was trained for a couple of weeks by the girl that was here before me. She was married and was starting a family. Now, here I'm going to get married next month and I'll be moving out of state. The doctor hasn't gotten a replacement yet. I hope he gets one soon so I'll be able to train her properly."

The doctor overheard the girls' conversation. "Are you at all interested in dental work?" he asked. "I need someone soon for Joan to train."

"I don't know. Just what is involved?"

"Joan can show you around and give you the pretest and application form. I'll go over it with you when you've finished."

UNIT 4-3

"A pretest, Joan? What on earth for?"

"Well, there are some simple math and other facts you have to know. Just general stuff."

After showing Sandi around, Joan gave her a short test like this one.

1. Addition

a.	b.	c.	d.
25	786	27	$17.65
76	1922	96	20.93
119	943	1972	80.27
22	79	81	112.75
	2013		

2. Subtraction

a.	b.	c.	d.
$175.00	$96.25	$108.56	23,689
- 18.50	-48.00	-93.78	-19,999

3. Multiplication

a. 1/5 x 25 = __________ b. 1/20 x 96 = ____________

c. 4/5 x 18 = _________

d.	e.	f.
247.18	56	$128.00
x 25	x 92	x .33

4. Division

a. $15\overline{)345}$ b. $109\overline{)982}$ c. $.96\overline{)197}$ d. $1.7\overline{)34.51}$

Be sure to check with your teacher before going on.

After Sandi had the test and the application completed, she talked to the doctor for a few minutes.

"How does all this math I did apply to the dental assistant job?"

The doctor explained that the test she took only tested her ability to do simple math problems, not actual job situations. He said also, that she would be doing some math in formula work, times and appointments, and weighing out some compounds.

At the completion of the interview, Sandi was asked to start work the next day after school. She was to try to get on the work program so she could work half days and get her training out of the way by the time school was out, which was when Joan would be leaving.

The first job Sandi had was to pull the files of the patients for the next day. All she did was to look up the next day's appointments and get the folders out of the file.

Note: for further information on filing, check unit 5-1, "File Clerk."

Sandi then had to develop some x-ray films. The doctor asked her how soon he would have them. Sandi thought it would be about seven minutes.

The developing procedure the doctor wanted followed was:

Developing time: five minutes
Washing (Using tweezers, drag films back and forth the length of an 11-inch pan of water a total of 100 passes, each pass requiring at least one second.)

Fix time: 30 seconds, agitated to encourage even fixing.

Sandi watched the second hand on the clock as she was washing the films. She was able to wash the film 10 times in 15 seconds. If this is Sandi's average time, how long will it take to complete the washing? 5.__________ Adding all the times, was Sandi's guess of seven minutes correct? 6.__________

After she developed the films, Sandi went to the front desk and looked up the appointments for the rest of the week. She did this to get used to the filing system. Joan told her that the doctor followed a schedule of one half hour for each dental filling, one half hour for each cleaning, and one fourth hour for each examination. For Friday, Sandi noticed that seven fillings, four cleanings, and seven exams were scheduled. How much actual chair time is this? 7.________

Sometimes the dentist does gold bridge work and caps. These appointments require one-and-one-half to two-and-one-half hour sittings, so Sandi has to schedule the appointments around them.

After learning office procedures, Sandi started working with Joan as she helped the docter. Mixing silver alloy for fillings was one of the important jobs she had to do. With each silver pellet required for a filling, she had to mix eight drops of alloy solution in a capsule. With a large filling requiring four pellets, Sandi would mix 8._______ drops of solution. If, during one day, the dentist used 18 pellets, how much solution was required? 9.________

During exams, Sandi had to record, on a dental chart, the exact work needed to be done. This required learning the terminology and symbolism. Sandi also had to set up the appointments for the patients. Realizing that people don't like to spend more than an hour in a dental chair, how many appointments should be set up for this patient:

He requires seven fillings and a cleaning. Using the time schedule listed earlier, this will use 10._______ hours so he'll need 11._______ different appointments.

Sandi really enjoyed dental assistant work. One of the benefits she had was free dental work. Her days normally went from 9 a.m. to 5 p.m.; and she liked the late starting time. She learned fast and was prompt, courteous, and efficient, so her raises were quite regular.

"On a job like this, you've got to like meeting and working with people," Sandi said as she summed up the work.

CLUSTER FOUR -- MEDICAL AND HEALTH

Unit 4

X-ray Technician

"Today I'm going to assign a topic to each of you. You'll research these yourself and sign up on this sheet for the day you want to give the results orally. There is room for three of you on each day. Are there any questions so far?"

About halfway down the third row a hand went up. Tex Nixon asked, "Do we have to use the topics you have listed, or can we choose our own?"

"What topic do you have in mind?"

"Well, I'd like to report on x-rays."

"That's fine! I don't have it written down but I'll put x-ray down here -- and sign you up for it."

There was a lot more work involved in researching this topic than Tex realized. He went to the school library and then to the public library. It seemed that most of the information he got was very sophisticated, so he went to the clinic downtown and talked to the x-ray technician.

"First let me mention something about terminology. When we take a picture with x-rays we don't call it an x-ray. It's a radiograph or picture. Actually I'm a radiograph technician."

"Why do they call it a radiograph? Does the name actually describe the operation?"

"In a way. You see, the x-rays are actually a result of electron or radio wave bombardment. They are directed onto a film. When they hit the crystals on the film, the film darkens and this causes a picture. This picture is rather like a graph and the name radiograph actually says this."

UNIT 4-2

"There must be a lot of math and science you've got to know in order to be a radiograph technician. Right?"

"Well, not a lot, but sometimes you do use quite a bit. Here, look at this." Tex took the sheet of paper the technician was holding. "These are some sample problems we give to people who think they might be interested in radiography."

1. Ratios and proportions

a. $\frac{?}{15} = \frac{40}{30}$ ans. ____________ b. $\frac{?}{10} = \frac{20}{30}$ ans. ____________

c. $? = \frac{15 \times 40}{30}$ ans. ________ d. $? = \frac{10 \times 20}{30}$ ans. __________

2. Percentage (means hundredths)

a. $\frac{1}{4} = \frac{25}{100} =$ ____________% b. $\frac{1}{2} = \frac{?}{100} =$ ___________%

c. $\frac{33\ 1/3}{100} =$ ___________% d. $.375 = \frac{37.5}{100} =$ ________%

3. Squares of numbers

a. 10^2 (ten squared) or $10 \times 10 =$ _________

b. $15^2 = 15 \times 15 =$ ___________ c. $25^2 =$ ____________

d. $17^2 =$ _____________ e. $65 \times 65 =$ _____________

Check the above problems with your teacher before going on with this unit.

Tex could remember most of the math involved from his junior high courses. It really seemed strange that as he watched the technician go through some demonstrations, never once was a paper used for figuring or even a reference made to some charts of calculations. He asked the technician about it.

"Most of the work becomes routine," he was told. "There's a lot of duplicate work, so after a while you've got most of the facts memorized."

"I'll bet it's not so easy at first."

"No, it's not. Here, we'll go through some of the typical problems."

During the next hour, Tex learned about the chemistry of the film and why the print looks like it does. He was told that the density of the material caused the lighter parts on the print.

Teeth appear very clear on the print because enamel is the most dense material in the body. Then in the order of lesser density comes bone, muscle, fat, and gas. The thickest and most dense parts of the body appear in shades of gray and gas (air) appears black. This is why you can see the outline of the body in an x-ray picture.

The technician then explained the five factors that are of prime importance in the exposure, or amount of radiation reaching the film. This controls the density or clearness of the picture.

1. Kilovoltage This is the power in units of 1000 volts. (Kilo means 1000.) Increasing the kilovoltage increases the number of high energy x-rays which have greater penetrating power and are not as readily absorbed by the structures being radiographed. Therefore, a greater number of rays reaches the film and provides a denser picture.

An increase of one-sixth in kilovoltage (KV) approximately doubles the exposure.

Example: 18 KV + (1/6 x 18 KV) = (18 + 3) KV = 21 KV

If the initial KV is 60 KV, what increase is necessary to double the exposure?

4. ____________

Initial KV is 30 KV 5.__________KV will double the exposure.

Initial KV is 24 KV 6.__________KV will make the exposure four times as strong.

This is not a strict proportion. However, it is accurate enough for general clinical work.

2. Milliamperage (MA) This is the tube current. As the number of electrons are increased, the number of x-rays reaching the target increases almost exactly by the same proportion. Again, this is not precise, but good enough for clinical purposes. Increasing the amperage has nothing to do with the penetrating power of the x-ray beam. It only affects the strength of the beam.

Example: To double the exposure, you double the MA. To triple the exposure, you 7.__________ the MA. To cut the exposure in half, you multiply the MA by 8.__________.

3. Time The actual exposure is directly proportional to the time of the exposure. Doubling the time doubles the exposure.

In actual practice, the time and the milliamperage are combined and called milliamper-seconds, abreviated MAS.

If a technician has a setup for 100 MA and 1/10 seconds, then we actually have

$$100 \text{ MA} \times \frac{1}{10} \text{ seconds}$$
$$= 100 \times \frac{1}{10} \text{ MAS} = 9. \_\_\_\_\_\_ \text{ MAS}$$

For faster exposure (as on a small child) we can increase the MA to 400 and reduce the time to 10. ________ to still get 10 MAS.

400 MA at $\frac{1}{25}$ sec. = 11. ________ MAS

350 MA at $\frac{1}{10}$ sec. = 12. ________ MAS

200 MA at $\frac{1}{30}$ sec. = 13. ________ MAS

4. Distance This is not as simple as the other three factors. As the distance is doubled, the exposure is reduced to $\frac{1}{2^2}$ or $\frac{1}{4}$ of the original. If it is tripled (increased by three) then the exposure is reduced by $\frac{1}{3^2}$ or 14. ________.

Use this formula: $\frac{I}{i} = \frac{d^2}{D^2}$ Where I is the intensity at the new distance,

i is the intensity at the old distance,

d is the old distance,

and D is the new distance.

If the intensity at 20 inches is 100 and we increase the distance to 40 inches what is the new intensity?

I = ?
i = 100 rays per min.
d = 20 inches
D = 40 inches

Now substitute into: $\frac{I}{i} = \frac{d^2}{D^2}$ or $I = \frac{d^2 \times i}{D^2} = \frac{(20)^2 \times 100}{(40)^2}$

$I = \frac{15.\_\_\_\_\_\_ \times 16.\_\_\_\_\_\_}{17.\_\_\_\_\_\_} = 25$

Now work out this problem. If the intensity of radiation at 60 inches is 10 rays per minute, what will the intensity be at 20 inches.

$$I = \frac{i \times d^2}{D^2} = \frac{18.\_\_\_\_\_\_\_\_ \times 19.\_\_\_\_\_\_\_\_}{20.\_\_\_\_\_\_\_\_} = 21.\_\_\_\_\_\_\_\_$$

5. Contrast This last factor is the difference in density between the light and dark areas of the film.

The function of contrast is to make the detail more visible.

Tex soon discovered that the work of an x-ray technician is extremely interesting.

"There's a lot to be said about the guy or gal that takes the shots for the doctors," Tex told the class during his report.

The teacher thanked him for his informative report and gave Tex an excellent rating for a job well done.

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

Unit 1

File Clerk

Phyla only recently had been eagerly awaiting her graduation and now that the day had come and gone she wondered what kind of work she would do. In school she had always liked the office education courses and had even talked to her counselor about it. Remembering that he had mentioned a local life insurance company among other companies needing office workers, she decided to check with them.

When Phyla talked with the employment office, she found that at present the only openings were for the position of file clerk. She found that she would need a great deal of accuracy in that job since any error on her part would put information in places unknown to the people who would have to make use of it. Locating the errors, finding the correct information, and refiling it would cause untold loss of company time and perhaps even loss of customers if the annoyance caused were great in the customer's eyes.

To test her perception of numbers and their relation, Phyla was told to take the following test:

1. Given the number 5,431,629, give the place value of:

   a. 1 ____________

   b. 2 ____________

   c. 3 ____________

   d. 4 ____________

   e. 5 ____________

2. Put the following numbers in proper sequence:

5163982791 a.____________ 5163982792 f.______________

4123456789 b.____________ 5164215969 g.______________

4123457869 c.____________ 5255252341 h.______________

4124357789 d.____________ 1234567891 i.______________

4125163916 e.____________ 3162981358 j.______________

3. The following names occur in random order. Put them in alphabetical order by last name, using the first names if identical last names occur:

Judith Demarcus Vivian Larson a. _______________ k. _______________

Joseph Maslewski Allen Trangle b. _______________ l. _______________

Allen Rolbiecki Charles Johnston c. _______________ m. _______________

Marlene Summers Dale McPherson d. _______________ n. _______________

Charles Blaylock Joe Doe e. _______________ o. _______________

Elmer Ostlund Pete Edeskuty f. _______________ p. _______________

Gene Mills Wayne Schmidt g. _______________ q. _______________

John Rolbiecki Duane Grummons h. _______________ r. _______________

Antoni Zurawski Erling Gruman i. _______________ s. _______________

Charles Johnson Alcestis Edeskuty j. _______________ t. _______________

4. File the following policy numbers in correct sequence. Be sure to list them first by group number, and then by contract or certificate number. (The first block of numbers is always the group number, and then the numbers after the hypen form the contract number.)

M653-124012 N398-516281 a. _______________ k. _______________

N389-516281 N399-516281 b. _______________ l. _______________

SU1056-318916 N389-514281 c. _______________ m. _______________

SU1057-412316 M348-214368 d. _______________ n. _______________

UNIT 5-1

SU1056-318917	M384-222416	e. ________________	o. ________________
M348-124012	SU1056-318926	f. ________________	p. ________________
M591-38016	N389-416891	g. ________________	q. ________________
N389-514282	SU1057-392316	h. ________________	r. ________________
SU1066-412316	SU1058-392163	i. ________________	s. ________________
SU1056-138916	M653-124011	j. ________________	t. ________________

Phyla wondered why there was so little math on the pretest and was informed that the most important part of her job would be accuracy, rather than calculations. These would be done by other people and then the material given to her for proper filing. Any errors on her part could cost the company time, embarrassment, and money.

There were about five main duties with which Phyla would concern herself:

1. She would need to either add or delete information on the cards which were kept on each person. This would occur when there would be a change in premium -- as when the customer passes into a new age bracket, or if a change in beneficiary occurs, or when dividends are paid on the policies. The right information quite obviously must be placed on the proper card. The file clerk has to know how to read tables to get the information.

2. All correspondence concerning any policies is kept in pouches and these are filed numerically. The file clerk needs to be very exact in comparing whole numbers.

3. Occasionally, a file clerk works in the mail room, primarily sorting the incoming mail so that it will reach the proper departments.

4. The file clerk would also have to answer phones and be able to pull the information cards and read information correctly from the cards. Also, when the agents need the entire file on a client, the clerk has to be able to swiftly locate it and begin it on its way.

5. Above all, a file clerk must be ready to ask questions whenever she has the slightest doubt about how to handle a filing difficulty. It is far better to get these matters settled correctly rather than mis-file information.

So, the most essential qualification for a file clerk is accuracy, accuracy, and more accuracy. Correct number perception is also important. The work is fascinating, for practically all the workings of the business goes through the hands of the file clerk. In fact, many choose to use this position as a stepping stone to other areas. It gives them a chance to study the whole situation and then they're able to choose departments they would be more interested in and then watch for openings there.

Phyla decided to take the job and started at $75 a week. This wasn't too good but the company provided her more than pay. She had as clean and neat a company to work in as could be found, a bus line got her to work, the company had a medical office where Phyla could even get physical check-ups, a section of the company would get tickets and make reservations for her for programs or concerts, a game area was available for use during 'breaks' and lunches were even furnished -- free! Phyla realized that these 'fringe' benefits are not available at all companies, and they sure made up for the fact that her check was not too big.

After only a couple of weeks, Phyla felt she had been doing a good enough job to talk to her supervisor about an opening as a key punch operator. This would mean some training given by the company and a little raise in pay.

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

Unit 2

Typist

Lou Ann wasn't sure just what she wanted to do with her life, but one thing seemed certain: if she wasn't going to be just living off her parents all the time, she'd have to have some job to earn the money to support herself. The question was, what?

Luckily, Lou Ann knew that her high school counseling department had ample material on available jobs so she stopped in one day.

Realizing that Lou Ann looked confused, her counselor saw her right away. After looking at her high school record, Lou Ann realized she had always enjoyed her business courses. Since her best grades had been in typing, her counselor suggested that she look more specifically into that.

While reading the materials in the guidance office, Lou Ann discovered that as a typist she would be one of almost 800,000. She was surprised (pleasantly) to learn that a salary of $400 a month was not too uncommon, and she knew typists enjoyed good working conditions, since they were usually placed in clean well-lighted offices.

Lou Ann then applied at the central office of her school for a summer job as a typist. Usually, the policy was to hire more experienced typists, but this summer the central office staff was going to be short handed because of a couple of curriculum writing teams which would need to have their materials typed up.

Before the materials would be published, it would be her job to type all of them at least twice, the first time from rough draft and then again before the final plates could be prepared from the corrected and re-edited copies.

There would be 55 "units" of material produced. Each unit would be six or seven pages in length and would be concerned with two or three main ideas.

One of the first problems that Lou Ann met was to decide how much paper the team would need in order to produce the finished copy. The pages used would be 8½" by 11". If she would be leaving margins of one inch on each side and one and one half inches on both top and bottom, then this would give her a "layout" page of 1.______ in length and 2.______ in width.

Pica type characters are spaced 10 to the inch, whereas elite type has 12 characters to the horizontal inch. In both cases, though, the typewriter carriage gives five lines to the vertical inch. That means that on each line, Lou Ann could put 3.______ characters (pica type) or 4._______ elite and 5._______ lines per page. Using her typing class equivalent of five letters equal one word, she calculated that each page could have 6.______ words of pica type or 7.______ words elite.

She learned that she was going to double space the lines, which would mean that each page would then contain either 8._______words written in pica, or 9._____of elite. Lou Ann's typing speed was 45 words per minute, so she calculated it would take her 10.______min.______sec. to type a page of elite and 11._______min._______sec. for one of pica.

UNIT 5-2

Lou Ann was told to try to keep each unit to six pages if at all possible. She typed the first two units and found that the first unit was 1948 words, and the second unit had 1880 words. Six full pages double spaced of elite type contains 12.________words as compared to 13._________words on six pages typed in pica. Consequently Lou Ann decided to type the units using 14._____ type characters.

The project director needed to know how much paper should be ordered to have a sufficient supply for all the work. He asked Lou Ann to give him the number of reams (500 sheets/ream) that he should order. He told her to figure that each unit would be typed twice and then 500 copies printed for an initial distribution. She was to allow 10 pages of "scratch paper" per unit for those writing the first draft, then figure seven pages per unit for the typed copies and she was to increase the figures for the typed copies five percent and the printed copies by three and one-half percent to allow for waste.

To get the first draft written would require 10 x 55 or 15._______ pages.

Typing each unit twice at 16._____ pages per unit for one copy would require 17.______ pages for each unit. Multiplying this by 55, the number of units, gives a total of 18._____ sheets needed. If an allowance for waste (five percent) is made, or 19.______ sheets (rounded off), Lou Ann would need 20.________ sheets of paper in all for her typing.

Printing the initial run of 500 copies per unit would require 500 copies x 21.______ pages per unit would mean that each unit would require 22.______ sheets of paper.

Add to this last figure a waste allowance of three-and-one-half percent, or 23._______ sheets (rounded off) and that would give a requirement of 24._______ sheets needed per unit. Since there were 55 units to be published, a total of 25._______ sheets of paper would be needed for the printing job.

Knowing that a ream of paper has 500 sheets in it, Lou Ann estimated that, to the nearest ream, the project would use:

26.___ream(s) for first draft 27.___ream(s) for typing 28.___ream(s) for printing Total needed would be 29.___reams for the project.

Since reams of paper are packaged 15 reams per carton and it is not possible to buy parts of a carton, Lou Ann told her employer to order 30._____cartons of paper.

In her actual work situation, Lou Ann would be dividing her time almost equally between actual typing and performing other services for the team members. She would be working from 8 a.m. until 4 p.m. with one half hour for lunch and two 15-minute coffee breaks, one in the morning and one in the afternoon. This left her 31.____ hours of actual work time, giving her 32._____ hours of actual typing time per day.

Lou Ann figured previously that it would take her 33._____ min. _____ sec. (Answer to 10) to type a page of elite type and when she calculated the order for paper supply she decided she needed 34._____ (Answer to 20) sheets of paper for her part of the project.

So, multiplying these two, she determined that she had 35.____ hours______ minutes for the job, or 36.______ hours (rounded to the nearest half hour). Dividing this by the number of hours per day that she would be able to spend actually typing, Lou Ann realized that the job would last 37._____ days.

She checked with her supervisor and was told to add two or three days for wrapping up loose ends at the end of the project. This meant that Lou Ann could count on 38.____ weeks of work.

She was also interested in computing the pay she would receive for her work. Lou Ann worked five days per week, but she was not paid for the half hour she took for lunch, so that her work day was 39._____ hours. This gave her a work week of 40._____ hours. At $1.95 per hour, her wages would be 41._____ per week. Since this job was temporary, and she wouldn't earn $1700 this year, she arranged to have no income tax taken out of her wages.

However, Social Security (FICA) would be deducted. Lou Ann deducted her FICA tax, which was 5.2 percent of her salary, or 42.________ to get her take-home pay of 43.________. This was a good start toward some of her expenses at the trade school she was planning to attend in the fall.

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

Unit 3

Auto Parts Counterman

Auto shop class had a special speaker one day. He was a local auto parts counterman who worked where Ned bought parts for his car.

Ned took notes on the counterman's talk and some of the things that he wrote down were:

- A counterman must have much background in repair and maintenance.
- He must keep up on the numerous new parts and materials added to new models each year.
- He must be able to supply information to people who ask what is needed to make certain repairs.
- A counterman must be throughly familiar with the many catalogs the manufacturers use.
- A counterman can expect to earn around $3 an hour.
- He can move into owning or managing his own parts store, although this is difficult.
- Countermen number 65,000 throughout the country.
- Most countermen receive a commission on what they sell.
- Training can usually be taken at local vocational schools.
- A counterman must be able to do some basic math to manage on the job.

As a check on the math ability of the students in that shop class the speaker put some math problems on the board and asked the class to see if they could work them.

1. 25% of $150 = ________

2. The original price of $13.50 is discounted 25 percent. What is the net price? __________

3. 37.50 + 29.75 + 3.45 + .75 = __________

4. Each of the following items is discounted 30 percent. What is the total after the discounts are given?

   a. 1 muffler @ $25.00 list ________
   b. 1 carburetor @ $12.50 list ________
   c. 1 switch @ $3.50 list ________
   d. Total bill after discounts ________

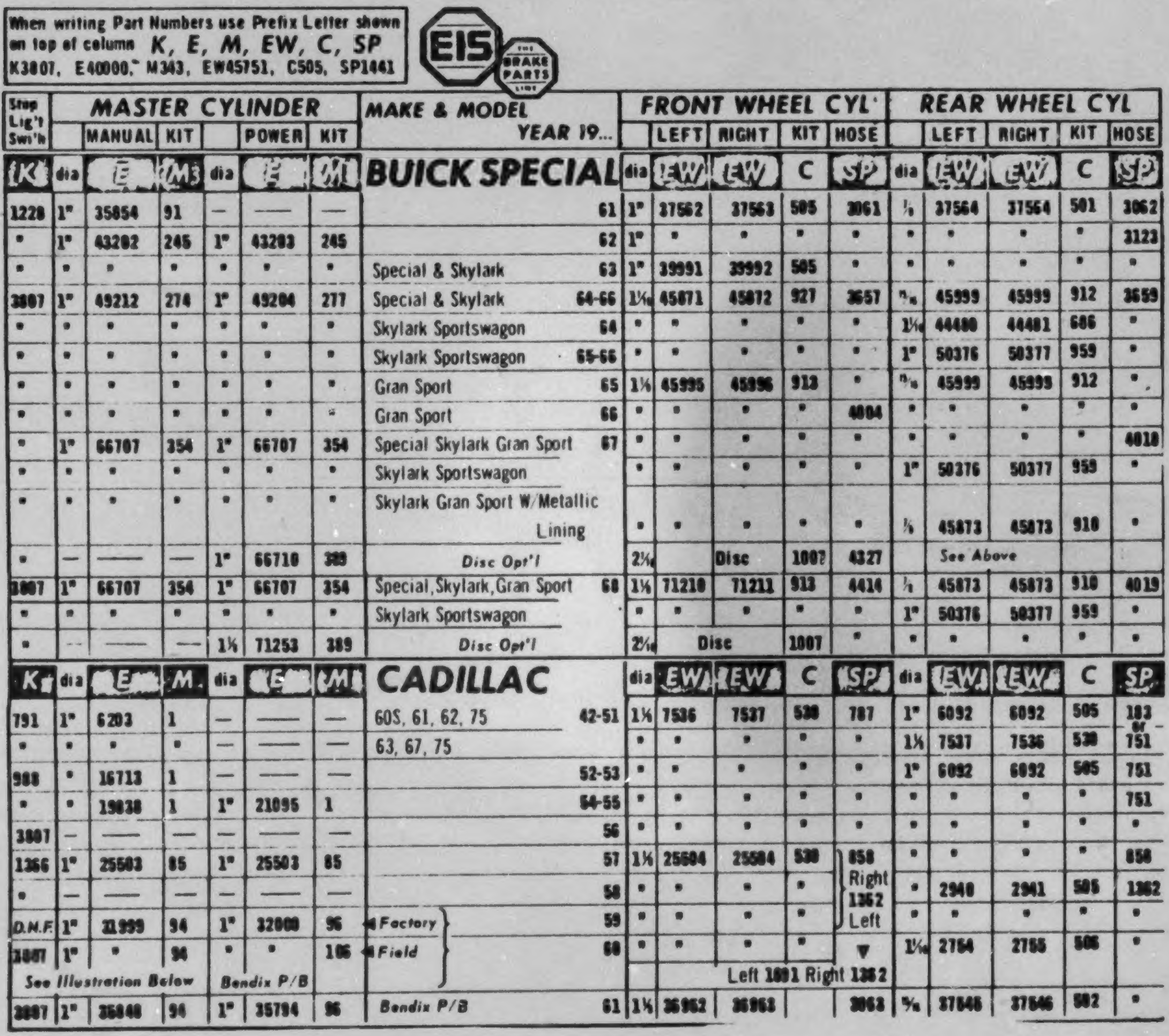
5.
```
  37.85
 125.43
  13.47
   8.99
    .33
  12.44
 ------
```

6.
```
  29.95
- 13.88
-------
```

7. a. 3 items @ $ 7.50 = ________
   b. 8 items @ .63 = ________
   c. 1 item @ 13.95 = ________
   d. 4 items @ 7.99 = ________
   e. Total bill ________

Ned got interested enough in auto parts counter work from the speech in shop class to want to check further into it. He went out and got some auto parts catalogs to start becoming familiar with. (Your teacher should have these books for you but if he doesn't, enough information is included here so that you can do the work.)

Part of p.10 of the E.I.S. Hydraulic Service Catalog-3914 is shown below:



When writing Part Numbers use Prefix Letter shown on top of column K, E, M, EW, C, SP
K3807, E40000, M343, EW45751, C505, SP1441

EIS THE BRAKE PARTS LINE

Stop Lig't Swi'h	MASTER CYLINDER						MAKE & MODEL	YEAR 19...	FRONT WHEEL CYL					REAR WHEEL CYL				
		MANUAL	KIT		POWER	KIT				LEFT	RIGHT	KIT	HOSE		LEFT	RIGHT	KIT	HOSE
K	dia	E	M	dia	E	M	BUICK SPECIAL		dia	EW	EW	C	SP	dia	EW	EW	C	SP
1228	1"	35854	91	—	——	—		61	1"	37562	37563	505	3061	⅞	37564	37564	501	3062
•	1"	43282	245	1"	43283	245		62	1"	•	•	•	•	•	•	•	•	3123
•	•	•	•	•	•	•	Special & Skylark	63	1"	39991	39992	505	•	•	•	•	•	•
3807	1"	49212	274	1"	49204	277	Special & Skylark	64-66	1 1/16	45871	45872	927	3657	15/16	45999	45999	912	3659
•	•	•	•	•	•	•	Skylark Sportswagon	64	•	•	•	•	•	1 1/16	44480	44481	686	•
•	•	•	•	•	•	•	Skylark Sportswagon	65-66	•	•	•	•	•	1"	50376	50377	959	•
•	•	•	•	•	•	•	Gran Sport	65	1⅛	45995	45996	913	•	15/16	45999	45999	912	•
•	•	•	•	•	•	•	Gran Sport	66	•	•	•	•	4004	•	•	•	•	•
•	1"	66707	354	1"	66707	354	Special Skylark Gran Sport	67	•	•	•	•	•	•	•	•	•	4018
•	•	•	•	•	•	•	Skylark Sportswagon		•	•	•	•	•	1"	50376	50377	959	•
•	•	•	•	•	•	•	Skylark Gran Sport W/Metallic Lining		•	•	•	•	•	⅞	45873	45873	910	•
•	—	——	—	1"	66710	389	Disc Opt'l		2 1/16		Disc	1007	4327		See Above			
3807	1"	66707	354	1"	66707	354	Special, Skylark, Gran Sport	68	1⅛	71210	71211	913	4414	⅞	45873	45873	910	4019
•	•	•	•	•	•	•	Skylark Sportswagon		•	•	•	•	•	1"	50376	50377	959	•
•	--	——	—	1⅛	71253	389	Disc Opt'l		2 1/16	Disc		1007	•	•	•	•	•	•
K	dia	E	M	dia	E	M	CADILLAC		dia	EW	EW	C	SP	dia	EW	EW	C	SP
791	1"	6203	1	—	——	—	60S, 61, 62, 75	42-51	1⅛	7536	7537	538	787	1"	6092	6092	505	183 or
•	•	•	•	—	——	—	63, 67, 75		•	•	•	•	•	1⅛	7537	7536	538	751
988	•	16713	1	—	——	—		52-53	•	•	•	•	•	1"	6092	6092	505	751
•	•	19838	1	1"	21095	1		54-55	•	•	•	•	•	•	•	•	•	751
3807	—	——	—	—	——	—		56	•	•	•	•	•	•	•	•	•	•
1366	1"	25503	85	1"	25503	85		57	1⅛	25504	25504	538	858 Right 1362 Left	•	•	•	•	858
•	—	——	—	—	——	—		58	•	•	•	•		•	2940	2941	505	1362
D.N.F.	1"	31999	94	1"	32000	96	Factory	59	•	•	•	•		•	•	•	•	•
3807	1"	•	94	•	•	106	Field	60	•	•	•	•	▼	1 1/16	2764	2765	506	•
See Illustration Below				Bendix P/B						Left 1001 Right 1362								
3807	1"	36848	94	1"	35794	96	Bendix P/B	61	1⅛	36962	36963		3063	15/16	37646	37646	502	•

The two price lists for wheel cylinder kits are shown below. Note that the one on the left includes prices for dealers buying in volume (therefore a lower net price) and the price list on the right is for gas stations, garages, and general auto trade. (If you have the complete catalog, be sure you look through it carefully.)

HIGH VOLUME DEALERS
NET PRICE

WHEEL CYL. KITS			
PART#	①	LIST	NET
C904	5	5.53	2.99
C905 ⑦	5	4.27	2.31
C906 ⑦	5	4.27	2.31
C907	*4	3.56	2.14
C908	*5	6.82	3.68
C909	5	1.26	.68
C910	2	1.86	1.00
C910-P ⑤	5	2.77	1.50
C912	1	1.86	1.00
C912-P ⑤	4	2.77	1.50
C913	1	1.86	1.00
C913-P ⑤	4	2.77	1.50
C927	1	1.86	1.00
C927-P ⑤	5	2.63	1.42
C928	4	3.10	1.67
C929	5	1.29	.76
C935	5	1.43	.84
C936	5	1.93	1.14
C940	5	1.19	.70
C941	5	1.19	.70
C942	5	1.26	.74
C958	5	1.26	.74
C959	3	1.81	.98
C959-P ⑤	5	2.90	1.57
C966	4	2.08	1.12
C966-P ⑤	5	3.12	1.68
C970	5	2.50	1.48
C971	4	2.40	1.42
C972	2	2.27	1.23
C972-P ⑤	5	2.85	1.54

LOW VOLUME DEALERS
NET PRICE

WHEEL CYL. KITS			
PART#	①	LIST	NET
C904	5	5.53	3.71
C905 ⑦	5	4.27	2.86
C906 ⑦	5	4.27	2.56
C907	*4	3.56	2.49
C908	*5	6.82	4.57
C909	5	1.26	.84
C910	2	1.86	1.25
C910-P ⑤	5	2.77	1.86
C912	1	1.86	1.25
C912-P ⑤	4	2.77	1.86
C913	1	1.86	1.25
C913-P ⑤	4	2.77	1.86
C927	1	1.86	1.25
C927-P ⑤	5	2.63	1.76
C928	4	3.10	2.08
C929	5	1.29	.90
C935	5	1.43	1.00
C936	5	1.93	1.35
C940	5	1.19	.83
C941	5	1.19	.83
C942	5	1.26	.88
C958	5	1.26	.88
C959	3	1.81	1.21
C959-P ⑤	5	2.90	1.94
C966	4	2.08	1.39
C966-P ⑤	5	3.12	2.09
C970	5	2.50	1.75
C971	4	2.40	1.68
C972	2	2.27	1.52
C972-P ⑤	5	2.85	1.91

Ned noted the steps that he would take if he were working in a parts store and a customer came in to buy a part.

- Find the proper catalog.
- Find page corresponding to the make and model of car.
- Find the proper year.
- Go to correct column and write down part number.
- Find price list and note the correct price.

To get some practice, Ned then pretended that a customer wanted the front wheel cylinder kit for a 1968 Buick Skylark. Using the catalog page and the price lists, he found that the kit number for that part is 8.__________ (add P to stock number because of power brakes). Then he found that the list price for that part was 9.__________. The net price, when purchased by an individual in small quantities, would be 10.__________, but if purchased in large quantity by a brake shop the net price would be 11.__________.

Out of curiosity Ned next went back and found a receipt for a part he had purchased. He erased it and filled it out for the wheel cylinder kits he had just checked up on. The finished receipt looked like this:

UNITED AUTO PARTS

Date______________

Purchaser_____________

Quantity	Stock No.	Description	List	Net	Total
1	C913-P	Wheel cyliner kit	2.77	1.86	1.86
			Sales Tax		.05
				Total	$1.91

12. Ned decided to do some more practicing and picked some cars and parts to complete sales receipts on. The first example he picked was an order for eight fuel pumps for the 351 cubic inch, 1969 Mercury Cougar. Using the tables that follow he filled out this sales receipt. (Use the Airtex number)

UNITED AUTO PARTS

Date ______________

Purchaser ______________

Quantity	Stock No.	Description	List	Net	Total

Sales Tax _____

Total _____

UNIT 5-3

Airtex Catalog, p. 36

604
Weatherly Index

APPLICATION DATA BY CAR, TRUCK OR ENGINE

CAR, YEAR & MODEL		ORIGINAL PUMP NO.	AIRTEX PUMP NO.	REPAIR KITS		DIAPHRAGM KITS	
				FUEL	VACUUM	FUEL	VACUUM
MERCURY PASSENGER—Cont.							
	COMET (MONTEGO)—Cont.						
1968	All w/289, 302 C.I. Engs.	M4567	4543CAX	....	....	....	....
1968	All w/390 C.I. Eng. (3/8" Inlet)	M4385	361AX	....	....	....	....
1968	All w/390, 428 C.I. Engs., (Exc. Police) (5/16: Inlet)	M4194	4194CAX	....	....	....	....
1968-70	All w/427 Special; 428–4V C.J. Eng.	M4441	362AX	....	....	....	....
1969	All w/302, 351 C.I. Engs.	M4567	4543CAX	....	....	....	....
1969	All w/390 C.I. Eng.	M4385	361AX	....	....	....	....
1970-71	All w/302–2V C.I. Eng.	M4896	910AX or 4896AX	....	....	....	....
1970-71	All w/351 C.I. Eng.	M4861	4861CAX	....	....	....	....
1970-71	All w/429 C.I. Eng. (Exc. C.J. or S/C. J. Engs.)	M4898	912AX or 4898CAX	....	....	....	....
1970-71	All w/429 C.J. Eng. (Exc. S/C.J.)	M4907	4907CAX	....	....	....	....
1970-71	All w/429 S/C.J. Eng.	M4842	4842CAX	....	....	....	....
	COUGAR						
1967	All V-8 w/289 C.I. Eng.	M4193	4193CAX	....	....	....	....
1967	All V-8 w/390 C.I. Eng. Before 9/9/66 (5/16" Inlet)	M4194	4194CAX	....	....	....	....
	After 9/9/66 (3/8" Inlet)	M4385	361AX	....	....	....	....
1968	All V-8 w/289, 302 C.I. Engs.	M4567	4543CAX	....	....	....	....
1968	All V-8 w/390 C.I. Eng. (3/8" Inlet)	M4385	361AX	....	....	....	....
1968-70	All V-8 w/427 Special; 428–4V C.J. Engs.	M4441	362AX	....	....	....	....
1969	All V-8 w/302, 351 C.I. Engs.	M4567	4543CAX	....	....	....	....
1969	All V-8 w/390 C.I. Eng.	M4385	361AX	....	....	....	....
1969	V-8 w/429–4V Special Eng.	M4842	4842CAX	....	....	....	....
1969-70	All V-8 w/302 Eliminator	M4910	4910CAX	....	....	....	....
1970-71	All V-8 w/351 C.I. Eng. (Exc. Cleveland)	M4888	4888CAX	....	....	....	....
1971	All V-8 w/429 Eng. (Exc. C.J.)	M4898	912AX or 4898CAX	....	....	....	....
1971	All V-8 w/429 C.J. Eng.	M4907	4907CAX	....	....	....	....

UNIT 5-3

Airtex Price List

INDIVIDUAL AIRTEX FUEL PUMPS AND COMBINATION FUEL AND VACUUM PUMPS

Pump No.	List	(1-5)	Stocking Dealer
4057AX...	$14.58	$ 8.75	$ 7.87
4070AX...	11.55	6.93	6.24
4074AX...	17.68	10.61	9.55
4084AX...	10.45	6.27	5.64
4090AX...	12.68	7.61	6.85
4123AX...	17.60	10.56	9.50
4131AX...	16.75	10.05	9.05
4138AX...	15.78	9.47	8.52
4141AX...	12.68	7.61	6.85
4147AX...	15.78	9.47	8.52
4149AX...	8.36	5.02	4.51
4156AX...	8.83	5.30	4.77
4159AX...	8.95	5.37	4.83
4172CAX..	13.64	8.18	7.36
4193CAX..	15.07	9.04	8.14
4194CAX..	17.13	10.28	9.25
4205AX...	7.75	4.65	4.19
4206AX...	20.88	12.53	11.28
4208AX...	11.19	6.71	6.04
4210AX...	10.63	6.38	5.74
4212AX...	9.88	5.93	5.34
4227AX...	12.50	7.50	6.75
4232AX...	9.38	5.63	5.07
4233AX...	15.44	9.26	8.34
4235AX...	14.58	8.75	7.87
4261AX...	13.54	8.12	7.31
4263AX...	10.90	6.54	5.89
4269AX...	10.75	6.45	5.81
4272AX...	21.58	12.95	11.65
4274AX...	19.00	11.40	10.26
4429AX...	$26.65	$15.99	$14.39
4430AX...	9.49	5.69	5.12
4432AX...	9.78	5.87	5.28
4436AX...	15.65	9.39	8.45
4437CAX..	13.12	7.87	7.08
4438CAX..	13.64	8.18	7.37
4439CAX..	12.94	7.76	6.99
4441AX...	12.65	7.59	6.83
4442AX...	23.95	14.37	12.94
4445AX...	15.68	9.41	8.47
4449AX...	12.95	7.77	6.99
4450AX...	17.90	10.74	9.67
4455AX...	18.13	10.88	9.79
4459AX...	10.78	6.47	5.82
4450AX...	9.49	5.69	5.12
4474CAX..	14.39	8.63	7.77
4478AX...	21.13	12.68	11.14
4483AX...	8.70	5.22	4.70
4484AX...	11.51	6.91	6.22
4486AX...	19.53	11.72	10.55
4487AX...	11.14	6.68	6.02
4488AX...	17.60	10.56	9.50
4490AX...	19.98	11.99	10.79
4494AX...	20.25	12.15	10.94
4512AX...	12.55	7.53	6.78
4540AX...	18.55	11.13	10.02
4543CAX..	15.07	9.04	8.14
4548AX...	13.35	8.01	7.21
4588AX...	23.58	14.15	12.73
4609AX...	11.53	6.92	6.23
4827AX...	$12.65	$ 7.59	$ 6.83
4842CAX..	27.83	16.70	15.03
4843AX...	12.65	7.59	6.83
4844CAX..	12.08	7.25	6.52
4845CAX..	12.55	7.53	6.78
4854CAX..	22.51	13.51	12.16
4861CAX..	14.15	8.49	7.64
4875AX...	11.14	6.68	6.02
4877AX...	17.93	10.76	9.68
4880NX...	9.47	5.68	5.11
4886AX...	9.62	5.77	5.19
4888CAX..	15.68	9.41	8.47
4895AX...	14.18	8.51	7.66
4896AX...	21.14	12.68	11.42
4897AX...	12.50	7.50	6.75
4898CAX..	13.45	8.07	7.26
4907CAX..	15.68	9.41	8.47
4910CAX..	16.73	10.04	9.03
4918AX...	19.18	11.51	10.36
4926AX...	16.33	9.80	8.82
4986AX...	15.60	9.36	8.42
4990CAX..	15.38	9.23	8.31
4991CAX..	14.15	8.49	7.64
6421AX...	24.60	14.76	13.28
6422AX...	25.00	15.00	13.50
6423AX...	14.85	8.91	8.02
6486AX...	12.60	7.56	6.80
6490AX...	10.78	6.47	5.82
6491AX...	11.64	6.98	6.29
6492AX...	11.64	6.98	6.29

The next problem he tried was an order for four fuel pumps for a 1968 Mercury Comet (Montego), 390 cubic inch, V-8 with 5/16" inlet. (Using the preceding tables, fill out the receipt on the next page.)

13.

UNITED AUTO PARTS

Date ____________

Purchaser ____________

Quantity	Stock No.	Description	List	Net	Total

Sales Tax ______

Total ______

The following problems need parts catalogs and price lists. The catalogs needed are as follows and may be picked up at an auto parts store or from the manufactor.

E.I.S. Hydraulic Service Catalog-39H
E.I.S. Automotive Corporation, Middletown, Connecticut

Airtex Fuel Pump Catalog-AX86
Airtex Automotive Division, Fairfield, Illinois

Blue Streak Ignition Parts Catalog-IG-23
Standard Motor Products, Incorporated
37-18 Northern Boulevard
Long Island City, New York 11101

14. Pete needs a new fuel pump for his 1967 Olds. He has a 400 cubic inch V-8.

No.	Description	List	Net
		Total	

15. Joe needed some ignition parts for his 1961 8 cylinder Chrysler Newport. Go to the Blue Streak Ignition Parts Catalog IG-23. The parts he needed were 1. points, 2. condenser, 3. rotor, 4. distributor head, and 5. ignition coil. Check the list price on the following page. (Cover up answer form until you have filled in the blank receipt.)

No.	Description	List	Net
	sub total		
	sales tax		
	Total		

No.	Description	List	Net
AL-5486XP	points	2.85	1.71
AL-140	distributor head	3.65	2.19
AL-153	rotor	1.00	.60
AL-111X	condenser	1.65	.99
AL-4KX	ignition coil	13.50	8.10
	sub total		13.59
	sales tax		.41
	Total		14.00

Stock No.	Description	List Price	Dealers' Price
AA-10	Stk.	1077.75	577.50
AA-12	Stk.	723.50	401.70
AA-13	Stk.	431.50	236.75
AA-20	Stk.	412.67	231.75
AA-22	Stk.	627.20	328.50
AA-34	Stk.	301.48	160.65
AA-35	Stk.	216.87	122.00
AA-41	Stk.	85.26	48.60
AA-42	Stk.	85.88	49.75
AA-47	Stk.	133.59	81.90
AA-49	Stk.	115.10	68.00
ACC			
ACC-560	Coil	22.50	13.05
ACC-560-12	Coil	31.50	18.27
ADL-1	Lead	.25	.15
ADL-2	Lead	.20	.12
ADL-3	Lead	.15	.09
ADL-13	Lead	.25	.15
ADL-14	Lead	.15	.09
ADL-15	Lead	.29	.17
ADL-16	Lead	.20	.12
ADL-17	Lead	.29	.17
ADL-18	Lead	.30	.18
ADL-19	Lead	.15	.09
ADL-25	Lead	.40	.24
ADL-26	Lead	.40	.24
ADL-28	Lead	.25	.15
ADL-47	Lead	.65	.39
AL-3J	Coil	10.60	6.36
AL-4K	Coil	11.00	6.60
AL-4KX	Coil	13.50	8.10
AL-5J	Coil	12.45	7.47
AL-25	Head	3.00	1.80
AL-34	Rotor	.83	.50
AL-35	Head	3.10	1.86
AL-36	Head	3.60	2.16
AL-63	Cond.	1.10	.66
AL-63X	Cond.	1.55	.93
AL-64	Rotor	.89	.53
AL-65	Head	2.60	1.56
AL-69	Rotor	.40	.24
AL-82	Brush	.10	.06
AL-83	Brush	.35	.21
AL-85	Rotor	.94	.56
AL-92	Head	3.85	2.31
AL-96	Head	2.40	1.44
AL-97	Head	4.00	2.40
AL-98	Rotor	.94	.56
AL-99	Rotor	.69	.41
AL-101	Cond.	1.20	.72
AL-101X	Cond.	1.55	.93
AL-102	Rotor	.99	.59
AL-106	Cond.	1.20	.72
AL-106X	Cond.	1.55	.93
AL-111	**Cond.**	**1.30**	**.78**
AL-111X	**Cond.**	**1.65**	**.99**
AL-113	Cond.	1.20	.72
AL-113X	Cond.	1.55	.93
AL-118	Cond.	1.30	.78
AL-118X	Cond.	1.65	.99
AL-119	Cond.	1.30	.78
AL-130	Head	2.20	1.32
AL-131	Head	2.65	1.59
AL-132	Head	1.95	1.17
AL-133	Head	2.05	1.23
AL-134	Head	1.85	1.11
AL-135	Head	2.60	1.56
AL-136	Cover	1.30	.78
AL-137	Head	6.15	3.69
AL-138	Head	2.10	1.26
AL-139	Head	2.60	1.56
AL-140	Head	3.65	2.19
AL-141	Head	1.75	1.05
AL-142	Head	2.10	1.26
AL-143	Head	2.60	1.56
AL-145	Head	9.75	5.85
†★AL-146	Head	3.00	1.95
AL-150	Rotor	1.15	.69
AL-151	Rotor	.77	.46
AL-152	Rotor	.74	.44
AL-153	Rotor	1.00	.60
AL-154	Rotor	1.15	.69
AL-155	Rotor	1.15	.69
AL-156	Rotor	1.42	.85
AL-159	Rotor	1.25	.75
AL-3756	Pt. Set	1.80	1.08
AL-3756X	Pt. Set	2.00	1.20
AL-4350	Pt. Set	1.70	1.02
AL-4350X	Pt. Set	2.00	1.20
AL-4450	Pt. Set	1.40	.84
AL-4450X	Pt. Set	1.60	.96
AL-4556	Pt. Set	1.80	1.08
AL-4556P	Pt. Set	2.25	1.35
AL-4556X	Pt. Set	2.15	1.29
AL-4556XP	Pt. Set	2.75	1.65
AL-4652	Pt. Set	1.70	1.02
AL-4652P	Pt. Set	2.25	1.35
AL-4652X	Pt. Set	2.15	1.29
AL-4652XP	Pt. Set	2.75	1.65
AL-5051	Pt. Set	1.70	1.02
AL-5051X	Pt. Set	2.00	1.20
AL-5255	Pt. Set	1.70	1.02
AL-5255-2	Pt. Set	3.30	1.98
AL-5255P	Pt. Set	2.25	1.35
AL-5255P-2	Pt. Set	4.50	2.70
AL-5255X	Pt. Set	2.15	1.29
AL-5255X-2	Pt. Set	4.30	2.58
AL-5255XP	Pt. Set	2.75	1.65
AL-5255XP-2	Pt. Set	5.50	3.30
AL-5261	Pt. Set	1.60	.96
AL-5384	Pt. Set	1.70	1.02
AL-5384P	Pt. Set	2.25	1.35
AL-5384X	Pt. Set	2.15	1.29
AL-5384XP	Pt. Set	2.75	1.65
AL-5486	Pt. Set	1.90	1.14
AL-5486P	Pt. Set	2.30	1.38
AL-5486X	Pt. Set	2.15	1.29
AL-5486XP	Pt. Set	2.85	1.71
AL-5657	Pt. Set	1.70	1.02
AL-5657P	Pt. Set	2.25	1.35
AL-5657X	Pt. Set	2.25	1.35
AL-5657XP	Pt. Set	2.75	1.65
AL-5661	Pt. Set	1.80	1.08
AL-5661X	Pt. Set	2.25	1.35
AL-5677	Pt. Set	1.80	1.08
AL-5677-2	Pt. Set	3.50	2.10
AL-5677P	Pt. Set	2.45	1.47
AL-5677P-2	Pt. Set	4.90	2.94
AL-5677X	Pt. Set	2.15	1.29
AL-5677X-2	Pt. Set	4.30	2.58
AL-5677XM	Pt. Set	2.90	1.74
AL-5677XP	Pt. Set	2.90	1.74
AL-5677XP-2	Pt. Set	5.80	3.48
BP			
BP71	Term. Cleaner	5.50	3.30
BP71A	Repl. Brush	1.55	.99
BP72	Term. Cleaner	5.00	3.00
BP72A	Repl. Br. Set	3.00	1.80
BPC710	Asst.	43.15	21.60
BPC720	Asst.	45.60	22.80
BPC721	Asst.	50.00	25.00
BSA-33	Asst.	39.75	20.80
BX-5	Washer	.03	1.80C
BX-16	Screw	.15	.09
BX-17	Screw	.20	.12
CC			
CC-1	Coil Cap	.25	.15
CC-2X	Coil Cap	.04	.02½
CDL-31	Lead	.55	.33
CDL-39	Lead	.60	.36
CDL-41	Lead	.70	42
CH-12V	Pt. Set	1.95	1.17
CH-14V	**Pt. Set**	**2.50**	**1.50**
CH-14XV	**Pt. Set**	**2.95**	**1.77**
CH-300	Rotor	.85	.51
CH-303	**Rotor**	**1.05**	**.63**
CH-304	Rotor	1.05	.63
CH-400	Head	3.70	2.22
CH-401	Head	2.60	1.56
CH-403	Head	3.15	1.89
CO-106	Cutout	6.50	3.90
CO-107	Cutout	5.65	3.39
CO-109	Cutout	5.65	3.39
CO-111	Cutout	3.80	2.28
CX-4	Br. Set	4.25	2.55
CX-6	Br. Set	2.25	1.35
D Diodes, priced individually			
D-1N, D-1P		2.60	1.51
D-2N, D-2P		3.10	1.80
D-50N, D-50P		8.00	4.64
D-51N, D-51P		10.00	5.80
D-52N, D-52P		8.00	4.64
D-53N, D-53P		30.00	17.40
D-54N, D-54P		12.00	6.96
DA-34	Asst. (Diodes, Tools & Tester)		32.45

★ New Item. †Availability to be announced.

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16. Mike needs a front wheel cylinder kit, a fuel pump, new points, condenser, rotor, and distributor head for his 1954 Chevrolet, straight stick, six cylinder car. Write up a receipt for him .

No.	Description	List	Net
	sub total		
	sales tax		
	Total		

17. How much is the list and net price for a starter switch for a 1966 Ford (Found in Blue Streak Ignition Parts Catolog)? list__________ net________

18. How much is the list and net price for a set of points for a 1965 model 1200 Volkswagen? list____________ net___________

19. What is the number and the net price of a fuel pump for a 1968 Toyota Corona? number___________ net___________

CLUSTER FIVE -- SECRETARIAL AND CLERICAL

Unit 4

Receptionist and PBX Operator

Walking through the high school a week or so ago, I ran across a gal I had known before I moved to my new home. She lived in my former neighborhood and her name was Phoebe.

I asked her what she was doing outside of school and learned that she was working as a receptionist-PBX operator at Horace Mann Industries. Phoebe found this work rather interesting, since whe was right in the main stream of everything going on at H.M.I. Practically no one came into the building without first of all checking with her. Since she was the first contact that these people had with H.M.I., it was important that she put them at ease with her pleasant personality and charm, in addition to handling her other duties. Some days, her entire day was spent primarily as a receptionist, whereas on other days she was able to handle some of her contingent duties which involved more math skills than she had expected in this type of a job.

As a receptionist, Phoebe spent much time on the phone assisting and directing callers to the proper people. She had spent much time during her first days on the job becoming acquainted with all the people at H.M.I.; but now that she knew most of them, it wasn't hard to place the calls. Phoebe was hired at $80 a week, and in addition, she received a vacation and a good health insurance plan. She worked in a neat reception area and found she was never bored.

When I asked Phoebe to describe some of the duties in which she used math, she gave the following information.

It was her duty to keep a record of the time in and time out of the people in the building. Since part of the paycheck was dependent on an hourly rate in the building, the records kept on this needed to be quite correct. For the remainder of their wages, the company employees turned in a "field ledger" of their hours; but this part was not Phoebe's concern. As an example, Mr. Black's hours on Monday were: In: 8:15, out: 9:05, in: 11:26, out: 12:02, in: 3:38, out: 5:42. Phoebe calculated that Mr. Black spent three separate periods in the building, with his time as: I. 1._____ hr., 2._____ min.; II. 3._____ hr., 4._____ min.; III. 5._____ hr., 6._____ min. This added up to to a total of 7._____ hours, 8._____ minutes. At $5.48 per hour, she calculated that Mr. Black had worked 9._____ hours in the building (to the nearest quarter hour) that day, and he had earned 10._____ x $5.48 or 11._____.

Phoebe gave some examples of typical time cards that she had to keep; since she had the records of what each was paid, she also computed the daily wages each made just out of curiosity.

For the following, compute the hours and minutes each person spent in the building, and then round this number to the nearest one-fourth hour, and then use that person's hourly rate to determine what their in-office earnings would be that day. The first time given is an IN time, the second an OUT time, etc.

12. Mr. Apple: 7:30-10:48; 11:35-12:30; 1:15-5:45 $4.45 per hour.

a.____ hr., ____ min. b.____ hr. rounded off, c.$____ daily wages

13. Miss Clareton: 7:25-11:45; 1:00-5:30 $2.80 per hour.

a.____ hr., ____ min. b.____ hr. rounded off, c.$____ daily wages

14. Mrs. Delaney: 7:45-9:30; 9:58-11:45; 1:00-6:00; $3.75 per hour

a.____ hr.,____ min., b.____ hr. rounded off, c. $______ daily wages

15. Mr. Edwards: 9:50-12:30; $6.50 per hour

a.____ hr.,____ min., b.____ hr. rounded off, c. $______ daily wages

16. Mr. Fortenberry: 7:30-10:15; 11:00-12:35; 1:15-4:35; $5.25 per hour

a.____ hr.,____ min., b.____ hr. rounded off, c. $______ daily wages

An additional task assigned to Phoebe was to make a study of the phone use in various parts of the building. The purpose was that in the interest of economy, phones which did not receive much use would be removed. Phoebe was to keep a record of the actual time that the phones were used, and then determine the percentage each phone's use is of the total time spent on telephones.

Phone Log

Station A		Station B		Station C		Station D		Station E	
Time of call	Length min.:sec.	Time of call	Length min.:sec.	Time of call	Length min.:sec.	Time of call	Length min.:sec.	Time of call	Length min.:sec.
8:30	5:00	7:41	6:32	9:05	48:32	7:48	2:41	11:00	8:42
8:48	4:38	7:49	5:10	10:30	4:18	7:56	5:06	11:10	14:15
9:15	2:26	7:58	3:18	11:20	6:32	8:10	3:45	11:28	5:03
11:18	1:48	8:10	2:18	12:14	25:16	8:15	4:58	11:36	20:16
11:25	5:25	8:15	1:08	4:19	2:16	8:24	3:18	12:03	1:48
12:00	3:16	8:17	2:06	5:25	15:01	8:30	4:19	12:05	26:41
12:08	4:06	11:00	1:56			1:48	50:49	12:45	12:48
1:58	20:16	11:15	2:63			3:00	5:44	1:10	5:33
3:30	24:32	11:21	5:33			3:30	6:28	1:18	6:18
4:20	5:16	11:40	2:18			3:45	2:16	1:30	8:41
4:34	10:05	11:59	10:38			3:48	2:16	1:40	3:25
5:20	2:41	12:30	45:10			4:11	1:10	2:28	5:19
		2:00	1:49			4:38	5:58	2:35	10:16
		3:00	2:03			4:45	6:28	3:00	1:49
		4:45	5:30			5:01	10:30	3:05	4:23
		5:35	6:10			5:16	20:05	4:28	3:59
								5:06	5:18
								5:14	3:02
								5:30	2:18

This log of the five phones was kept on a particular day. For each phone, Phoebe had to find the following information:

17. Phone Total time % of total

A ________ ________

B ________ ________

C ________ ________

D ________ ________

E ________ ________

Total ________ 100%

To find the percent of total use, divide the individual time by the total time and write the answer as a percent.

Also, since the cost of operating each telephone was 8.5¢/minute (which takes care of the pay which the PBX operator receives, as well as the cost of the telephone service), Phoebe had to take the operating time for each unit and find the actual cost to charge each department. She found the charges to be:

18. Station A ________________ Station D ________________

Station B ________________ Station E ________________

Station C ________________

Phoebe recorded this information in the ledger and called it a day. It wasn't often that she was asked to do this type of work, but the varying nature of her job was one of the things that made it interesting to her.

CLUSTER SIX -- MECHANICAL OCCUPATIONS

Unit 1

Auto Mechanic

Mike would be graduating from high school in the spring and he thought quite a bit about what he would do after graduation. He did not want to go into a trade just to say he had a job. It seemed important to Mike that his occupation be one that he really enjoyed. Mechanical jobs really caught his eye, especially tune-up and rebuilding work in a speed shop.

There had been some contact with that kind of work in his auto shop class and his part time job as a service station attendant, also. He thought checking into a job at a speed shop could be a profitable experience! Mike checked the yellow pages and contacted a few of them.

Wow -- was he pleasantly surprised. There were all kinds of sophisticated machines and charts around and the places were spotlessly clean.

While Mike was being interviewed, the owner of the shop told him about the pleasant working conditions, good hours, and very good pay. Of course, the pay would not start that high since there would have to be considerable training. Mike was also encouraged to start an evening course in "speed" work at the local trade school.

As the interview progressed, Mike was asked about his high school grades, particularly in his shop and math classes. Mike had done OK in math -- not real sharp -- but OK. His shop grades were very good. The manager told Mike that he had to take a short exam containing some math and general information problems.

UNIT 6-1

See how well you can do on this sample test.

1. Decimal calculations are extremely important in automotive mechanics.

Perform the following operations:

a. 4.125
- .023

b. 3.126
- .019

c. 455 cu. in. engine
x .765 hp/cu. in.
(This factor converts cubic inch displacement to horsepower for some General Motors engines.)

d. 327
x .765

e. 2.00
x 1.05

f. 8.32
.067
1.23
0.09
23.600

g. 283.3
307.2
327.4
351.1

h. 2.54 cu. inch
x 2.54 cu. inch

__________ (first answe

x 2.54

__________ (final answer)
(This answer is the number of cubic centimeters in 1 cubic inch.)

i. 12.4 gals.) 184 miles
miles per gal.

j. 21.2 gals.) 289 miles
miles per gal.

2. Rounding is used in calculating displacement. Work the following problems:

a. 3.036 = ________(nearest hundredth)

= ________(nearest tenth)

= ________(nearest whole number)

b. 37.7
x 3.14

________= (nearest hundredth)

________= (nearest tenth)

________= (nearest whole number)

Be sure to check with your teacher before going any further.

Mike did very well on the exam and must have had a lot of the right answers during the interview with the manager of Super Speed, Inc., because two days later he received a call and was asked to report to work the following Monday at 7:30 a.m.

Mike wanted to get his hands on those special engines, but his first couple days were spent in observation, doing simple tune-up work, and reading engine design magazines and books. (To top it all off, he was asked to take books home to read.)

One of the jobs in the shop was a Z-28 Camaro with a 302 cubic inch engine. The shop manager showed Mike the work order for it.

"We've got to resleeve this one with .20 oversize. I want you to figure out the new displacement. Then using .975 to convert from cubic inches to horsepower, since this is a high performance engine, find the new horsepower rating. "Golly, where do I start?"

"Here, follow this example."

Mike took the work order and the paper with the example on it and went to the office where he could work on a table.

The example showed him that calculating cubic inch displacement (C.I.D.)

involved knowing some formulas.

He would use -- C.I.D. = $n \times \pi \times r^2 \times h$

where n is the number of cylinders
$\pi = 3.14$
r^2 is ½ the bore of the cylinder multiplied
times itself and h = the length of the stroke

On the work order he noticed the bore of the cylinders on a 302 Z-28 Camaro standard was 4 inches, the stroke was 3 inches, and the actual displacement was 301.6 cubic inches when the answer is rounded off to the nearest tenth of a unit.

The only number that changed in this problem was the bore. It changed from 4 inches to 4.20 inches. Since r is ½ the bore, r must equal 2.10 inches instead of 2.00 inches.

To figure this problem out, Mike used the above formula to set it up.

$$\text{C.I.D.} = n \times \pi \times r^2 \times h$$

$$\text{C.I.D.} = 8 \times 3.14 \times (2.10)^2 \times 3$$

$$= 25.12 \times (2.10)^2 \times 3$$

$$= 75.36 \times (2.10)^2$$

$$= 332.35$$

$$\text{C.I.D.} = 332$$

This really surprised him. It seemed strange that the cubic inch displacement could be increased from 302 to 332 just by increasing the bore .20 inches.

Now Mike had to find the new horsepower rating. The foreman of the shop had told him that for this engine he was supposed to use .975 to convert from cubic inches to horsepower.

old engine	new engine
302	332
x.975	x.975

__________ = 3. ________ h.p.   __________ = 4. __________ h.p.

(Round the answers to the nearest whole number.)

That was quite an increase. Let's practice on another problem.

Pontiac 6, overhead cam, 251 cubic inch 215 h.p.

Job description:

Resleeve for .150 oversize pistons
Standard bore is 4 inches
Standard stroke is 3.33 inches
Cubic inch to h.p. conversion factor is .865
Cylinder bore after resleeving will be 5. __________

$r = \frac{1}{2}$ bore will be 6. __________

C.I.D. = $n \times \pi \times r^2 \times h$

$n = 6$

$\pi = 3.14$

$r = 2.075$ inches, $r^2 =$ 7. ________ square inches

$h = 3.33$ inches

C.I.D. = 8. __________ cubic inches

= 9. __________ cubic inches (rounded to nearest whole number)

The horsepower of the rebuilt engine is (cubic inch displacement x .865)

10. __________ h.p. Rounding this to the nearest whole number, we get

11. __________ h.p.

Speed shops work on cycles as well as cars. One of the first jobs Mike had was to tear down an old Harley 900c.c. to be rebuilt and hopped-up.

The original engine developed 58 h.p. What was the horsepower per cubic inch ratio of this engine? Let's see, first you have to change the 900 c.c. to cubic inches. To do this you have to divide 900 c.c. by the number of c.c.'s in a cubic inch. From the sample employment exam, you can find out that there

are 12.______ c.c.'s in 1 cubic inch. (Round off to nearest tenths)

are 12.______ c.c.'s in 1 cubic inch (Round off to nearest tenths). Dividing this number into 900 c.c., you get 13.______ cubic inches. Now all you do is divide the number of cubic inches into 58 horsepower. What do you get? 14.______ How does this compare with the Z-28 Camaro and the Pontiac-6? 15.______

Engine	H.P.	Displacement in cubic inches	H.P./cubic inch
Chevrolet	250	327	16.__________
Ford	225	289	17.__________
Corvair	140	164	18.__________
Pontiac 6	215	250	19.__________
Buick	390	455	20.__________

The math work on the last few pages are just some samples of the work Mike did in the speed shop. There are many more complicated problems which we don't have time to cover.

Mike's close involvement with dragstrip and hot street cars gave him a chance to work and pursue a hobby at the same time.

CLUSTER SIX -- MECHANICAL OCCUPATIONS

Unit 2

Small Appliance Repairs

When Ken was a small boy, one of his hobbies was to dismantle and reassemble old clocks, door locks, and small motors. His interest in small mechanical objects continued throughout high school. During this time, he had built and flown small gas powered airplanes. Because the tools required were small and light, Ken had no problem pursuing his hobby in his dad's garage or workroom in the basement. As his interest and proficiency increased, Ken was called upon to "look at" Mom's iron, repair an electric can opener, and do a few repair jobs for friends of the family.

At the suggestion of an uncle, Ken decided to check out the possibility of opening a "Fix-It" shop in his dad's garage. The yellow-page directory from Minneapolis had a lot of fix-it shops or small appliance service centers listed so Ken picked out a couple of shops and visited them.

There was no formal interview with the owner of the shops, since Ken did not want to be hired; he rather wanted to open his own shop. Ken spent the whole week observing the operations of appliance shops and was quite surprised at the amount of paper work that would be involved in operating his own business.

Also surprising was the extent of the use of mathematics in the shop operation. Below are some examples.

1. Add these columns of figures

a. $18.00	b. $ 26.73	c. $ 1.79	d. $36.00
2.69	119.12	6.18	47.00
.72	93.00	6.00	83.00
10.80	.79	2.36	14.43
1.19	243.32	10.43	10.80

2. Multiply each of the answers to problem one by 3% to find the sales tax.

a.__________ b.__________ c.__________ d.__________

3. Find the total cost for these jobs.

a. 2½ hours labor @ $7.50 = ________

$13.92 in parts = ________

3% sale tax on parts only = ________

Total bill = ________

b. ½ hour labor @ $8.00 = ________

Replacement parts 2 @ $1.39 = ________

3% sale tax on parts only = ________

Total bill = ________

Be sure to check your work with your teacher before proceeding.

Ken was most surprised however, at the costs of operating a small business. Overhead, inventory, legal service, tax advisors, machine and tool repair, and salaries all had to be considered.

Most of the work Ken did was on a flat rate basis. This meant that the amount he charged for a job, say, repairing an electric motor for a washing machine, is quoted for him in a manual called a rate book. If the motor requires just a starting switch and bearing, the book may quote a price of $18 plus parts. If the motor needs to be rewound, the cost may be $26 plus parts. But some of the jobs weren't in the rate book, so Ken charged an hourly rate of $8 plus parts.

Let's look at some typical jobs which Ken did. A friend brought in a lawn mower, electric knife, and an electric train transformer to be repaired. He told Ken that they "just don't work" so Ken had to find the problems.

The lawn mower needed a spark plug @ $1.49, points and condenser @ $3.59 per set and required 45 minutes to do the job. The electric knife just needed a new cord at $2.39 and it took 15 minutes to repair. The electric train transformer needed a new coil and field contact. Ken would have to send to the manufacturer for the parts.

When he looked at the catalog he noticed the cost for the needed parts came to more than a new transformer, so he called the customer and told him this. The customer wanted the new transformer at $12.50 plus postage @ $.70.

Since the customer wanted the replacement, Ken did not charge labor for disassembling the transformer.

4. What was the total charge for labor? a.__________

   What was the total charge for parts? b.__________

5. What was the charge for 3% sales tax (parts only)? __________

6. Be sure to add the postage charge! __________

7. Total bill __________

Another job was on a mini-bike. The parts required were:

Drive chain @ $7.50, front drive sprocket @ $9.98, drive bushings 2 @ $.59 each, labor 1½ hrs. @ $8

8. Total parts cost = __________

9. 3% sales tax = __________

10. Labor cost = __________

11. Total bill __________

Later in the afternoon another customer brought in an electric blanket, Mixmaster, and toaster.

Parts needed were:

New electric blanket control	$8.50
Bushing and gear for can opener	$4.39
Speed selector switch for mixer	$3.70
New cord for toaster	$2.79
Three and one-half hours labor @	$8

12. Total parts = __________

13. Sales tax = __________

14. Labor charge = __________

15. Total bill __________

Soon Ken realized that there is extreme satisfaction in owning your own business. In running an honest shop he had more than enough work to keep him busy for eight hours a day, five days a week. He soon learned that a self-employed person has a hard time maintaining regular hours and days.

Often Ken was called upon to fix items that the owner wanted quickly and he found himself working some evenings and weekends. The fun of working with the customers and the pleasure which came from seeing a broken item work again, more than made up for the problems Ken encountered.

CLUSTER SIX -- MECHANICAL OCCUPATIONS

Unit 4

Machinist

Alex had grown up just down the street from a large company that made parts for some large machines. He had never visited the place, though, so one day he decided to go in and see what went on. They wouldn't let him walk around the shop by himself; a foreman gave him protective glasses and led him on a tour.

Alex saw many men working with different kinds of large machines. He asked what these workers were called and found that most of those who were running the machines were called machine operators, but some of the more highly skilled were called tool and die makers. These men set up and operated all the basic machine tools. They read blueprints and worked with the basic metalworking hand tools and instruments. The operators computed feeds and speeds on the machines, working accurately to tolerances of one ten-thousandth of an inch.

After touring the plant, Alex went back to the personnel office and was shown one of the tests given to the apprentices as they go through their training. Alex looked the test over very carefully and tried to do as much as he could of the test.

1. 1/10 of 200 = ____________

2. 3 1/4 + 93 1/16 + 3/8 = ___________

3. Screw threads are being cut at the rate of nine per inch. How many screw threads will be in a piece of stock 13 inches long? ____________

4. .0038 + .0308 + .00007 = ____________

5. 1/100 of 375 = ____________

6.
```
17.69
 6.89
 4.032
 8.1834
-------
```

7. 17.865 - 3.427 = __________

8. 3 x 18.789 = ____________

9. 3.12 x 7.8 = ____________

10. A machine can cut off .02" of metal on a piece of stock in half a second. How long will it take to cut off .12"? __________

11. A man with a file can remove 1/32" of metal on a piece of stock on each stroke. How many strokes of the file are necessary to remove 7/16"? ______

Check with your teacher before you proceed.

Each machinist in a shop is responsible for the accuracy of his work. If you were to machine a piece of stock that is a part of a larger piece, you would have to meet certain tolerances for it to fit.

A tolerance is the total amount of variation from a standard size.

Today's modern mass production demands high tolerances and exactness so that parts are interchangeable. If one part breaks down, another can take its place.

Machinists work with fractions of an inch. A table of common decimal fractions follows.

Table A

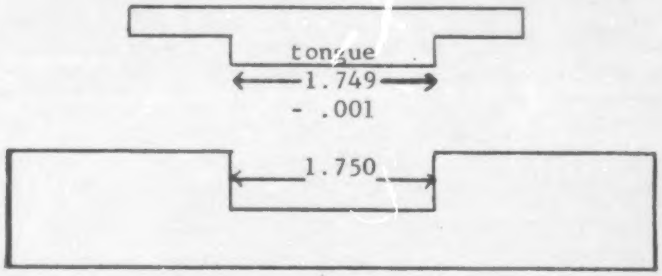
One-tenth inch = 1/10" = 0.1"

One one-hundredth inch = 1/100" = 0.01"

One one-thousandth inch = 1/1000" = 0.001"

One ten-thousandth inch = 1/10,000 = 0.0001"

An example of tolerance is shown in the picture below.



The top part has a tongue that ideally should be 1.749", but can be .001 less or 1.748 (negative sign means less). So this piece has a tolerance of one one-thousandth inch.

Another way to write tolerance is to say that a piece of stock is to be 3.45" ± .02" in diameter. This means the piece may be as large as 3.47" or as small as 3.43" in diameter. (The sign ± means more or less by .02".) The tolerance is .04" (the total variation possible).

UNIT 6-4

Find the largest and smallest size each piece of stock can be as well as the tolerance for each of the following problems:

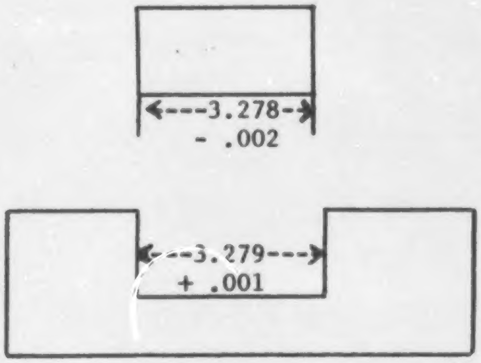
A piece of stock must be "turned down" on a lathe to 2.781" ± .003.

12. Largest_________Smallest____________ Tolerance____________

How much would a round piece of stock have to be turned down on a lathe if it is 4" in diameter to begin with and must fit in a hole drilled out to 3.47". There can be -.005 tolerance. 13. Most Turned Down __________

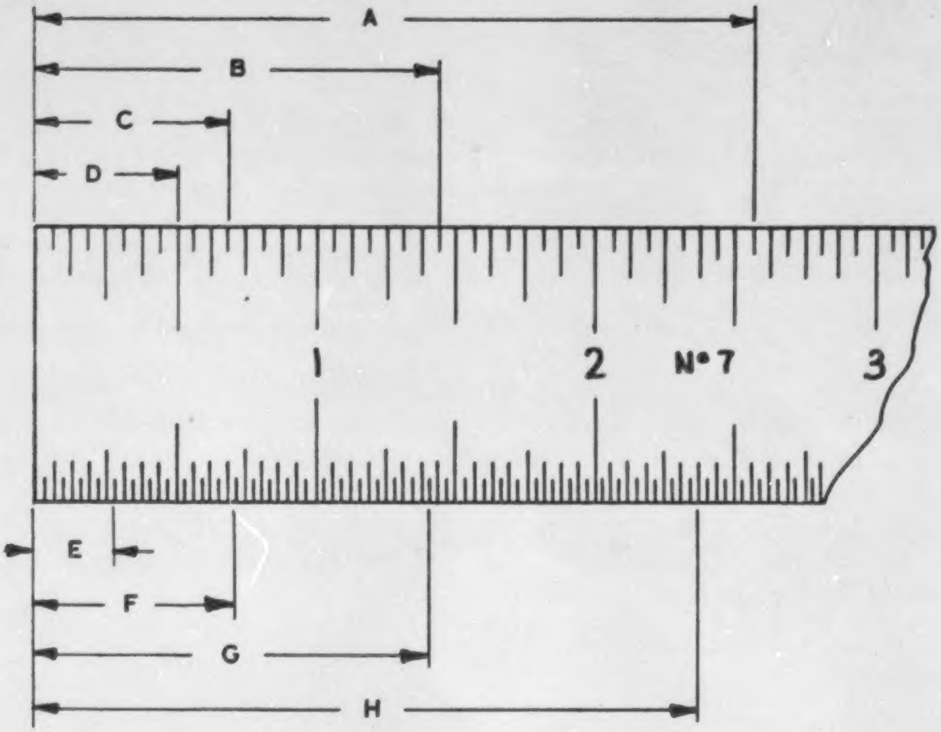
Least Turned Down____________ Tolerance____________

What is the largest amount of "play" (space between the two pieces if inserted) possible in the diagram below. 14._____________



15. Various gauges are used for measuring accurately. A steel ruler is used for measuring to 64ths of an inch. For different shaped figures, and more accuracy, different type rulers are used. Calipers and micrometers are other devices used. The shop teacher will show you samples and uses of many of these instruments.

An example of a steel rule is pictured below.



Give the length of the distance to each point.

a. Point A__________

b. Point B__________

c. Point C__________

d. Point D__________

e. Point E__________

f. Point F__________

g. Point G__________

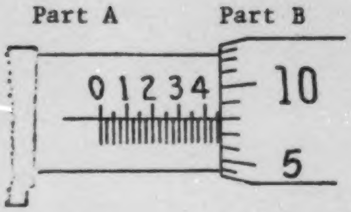
h. Point H__________

Micrometer

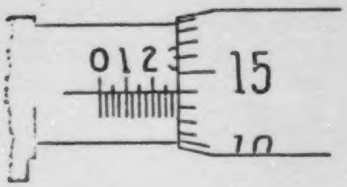
The gauge part of a small micrometer is shown to the right. (Ask your teacher for a micrometer that you can handle.)

Note: not all micrometers have the same graduations (scales).

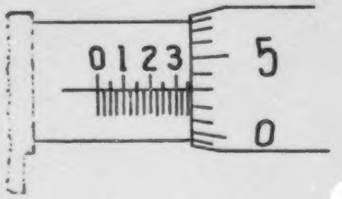
Example 1.



Example 2.



Example 3.



Example 1:

The large graduations on part A are 1/10 (.100) of an inch. Four of these are showing.

4 x .100 = .400

Each of the large graduations (1,2,3,4) are divided into four parts; each of these parts would be .025. Two of these are showing after the number four. 2 x .025 = .050

The graduations on part B are in 1/1000 (.001) of an inch. There are eight showing. 8 x .001 = .008 Total reading = .458 inch.

Example 2:

16. How many large graduations are showing on part A?

a.______ b.______ x .100 = c.______

17. How many small graduations are showing between two and three? a.______ b.______ x .025 = c.______

18. How many graduations are showing on Part B?

a.______ b.______ x .001 = c.______

19. Total reading= ________

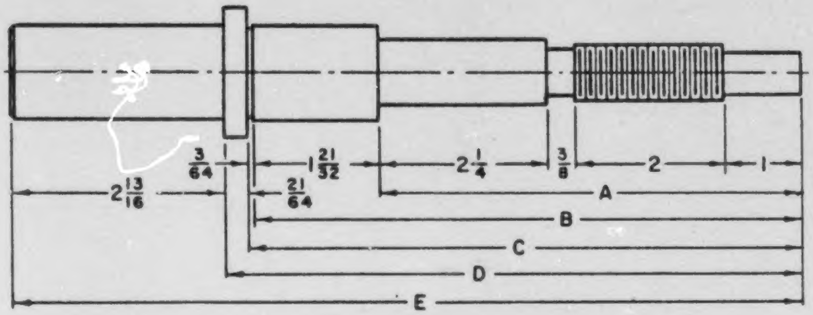
Example 3:

Do this one on your own. Check your reading with your teacher.

20.__________ reading

If you have a micrometer, try measuring various materials with it. Record your readings and what they were of on a sheet of paper and keep them with this unit. If a caliper is available, try some measurements using it.

A sample blueprint of a machined piece follows.

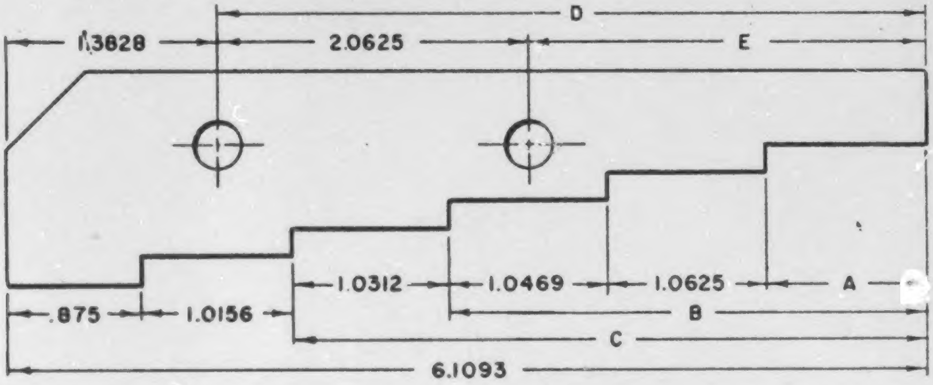

3/64
1
1 21/32
2 1/4
3/8
2
1
2 13/16
21/64
A
B
C
D
E

21. What is the length of A? ______________

22. What is the length of B? ______________

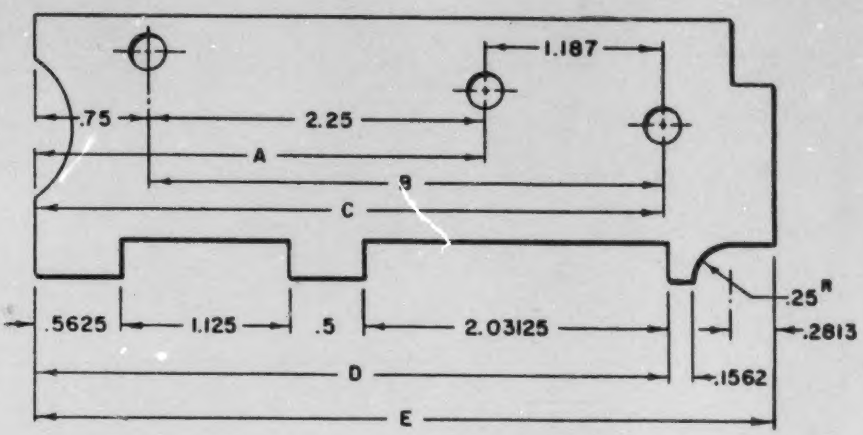
23. What is the length of E? ______________

An example of the blueprint for a plate is shown below.


D
1.3828
2.0625
E
1.0312
1.0469
1.0625
A
.875
1.0156
B
C
6.1093

Find the dimension of 24. A __________ 25. B__________ 26. C____________

As a final blueprint reading, see if you can find the dimensions of A, B, C, and D from the following blueprint.


1.187
.75
2.25
A
B
C
.5625
1.125
.5
2.03125
.25R
.2813
D
.1562
E

27. A = ______________ 28. B = ______________ 29. C = ________________

30. D = ______________

At this point Alex felt that he understood what a machinist does. He wanted to know more about how to get into this line of work, however, so he went back to his school and talked to both his counselor and a shop teacher. He also made contact with the local apprenticeship office.

CLUSTER SEVEN -- DRIVING OCCUPATIONS

Unit 1

Race Car Driver

Paul, like many male high school students, was very interested in automobiles. This naturally seemed to lead to automobile racing and many trips to the local dragstrip. Dragracing offered short runs at extremely fast accelerations. His trips to the dragstrip lead him to another racing event at Donnybrooke. Here Sports Car Club of America sponsored many races for amateurs. Also, some big drivers were racing in one of the many independent races (not sponsored by a national organization) staged at Donnybrooke. Paul met some interesting people from whom he got a lot of additional information about some of the national organizations for car racing. Some of the facts he learned about one of the organizations, NASCAR, were that the NASCAR Grand National Series has probably the largest number of racers in the world. In the past, the big car companies like Ford and Chrysler would subsidize drivers like Bobby Isaac (the 1970 Grand National winner) and Richard Petty. But in 1971 most of the big company backing was removed. This means that the independent driver (perhaps operating on $30,000 a year in comparison to $250,000 to a company backed operation) may have a better chance. Some major rule changes will also change future results.

The Automobile Competition Committee of the United States (ACCUS) has set the maximum engine size at six liters (approximately 61 cubic inches equal one liter; therefore, six liters equal 1.________ cubic inches).

One four-barrel carburetor with a 1 11/16 inch venturi (a venturi regulates the amount of fuel/air mixture allowed in the carburetor) in a car weighing a minimum of

3,800 pounds is allowed. The previous cubic inch allowance, 430 maximum, can still run this year (so investments won't be lost) but with a carburetor-restrictor plate which cuts the venturi to 1 1/4 inches (which is 2._____ inches less than the one allowed with a six liter car).

"The 430 cubic inch engine would be a 3.__________ liter engine (divide 430 cubic inches by number of cubic inch in a liter).

"The rules committee feels by restricting air intake, the output of the 430 cubic inch will be equal to the six liter, 366 cubic inch engine. The minimum weight for the 430 cubic inch restrictor-plate engine will be higher than the smaller engine -- 3,900 pounds -- which will also help equalize the two. Both should be able to crank approximately 500 horsepower. This, for the 366 cubic inch, six liter model would be 4.__________ horsepower per cubic inch, and for the 430 cubic inch, 5.__________ horsepower per cubic inch.

"The horsepower output per pound of car for the 3,800 pound car is 6.__________."

It would be interesting for you to check these ratios with your car or a car belonging to someone you know.

To do so, find the horsepower, bore, stroke, cubic inch displacement, and weight of the car. Then find 7., horsepower per cubic inch and 8., horsepower per pound.

Make of car ___________

Year ________

Hp rating_________

Bore________

Stroke__________

Listed cubic inch____________

Weight__________

Answers:

7.___________

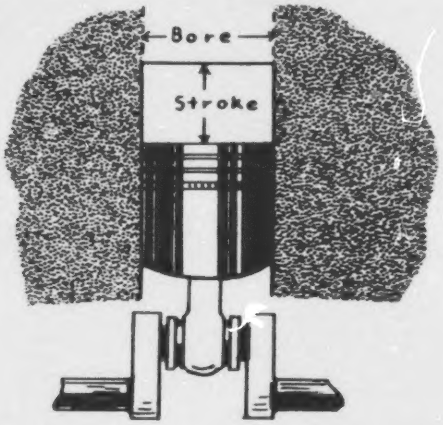
8.___________

The 1971 season of NASCAR will see the total Grand National purse at three million dollars and such races as the Dayton 500, Golden Gate 500, and the World 600.

The race car driver, along with his mechanics, must decide which combination of cubic inch displacement, carburetor, etc., is best. Some of those owning a 427 cubic inch engine will cut down the stroke to reduce the cubic inches to 366. Petty enterprises has been running a 1971 Charger with its hemi destroked to 366 cubic inch. Probably, with the four-barrel carburetor, it is getting as much or more horsepower as it would with the 426 and restrictor plate on the carburetor.

Paul stopped to think about how this change, from 426 cubic inch to 366 cubic inch, can be done. He found that the method of finding the cubic inch displacement of an engine is to find the volume displaced by each cylinder and to multiply by the number of cylinders.

The formula to find volume of a cylinder is $V = \pi r^2 h$. $\pi = 3.14$, r = the radius of the cylinder (radius = ½ bore), and h is the distance the piston moves through the cylinder (or stroke).



The cubic inches in Ford's 427 cubic inch engine can be checked by finding the bore and stroke. The bore is listed as 4.23 and the stroke as 3.80. Using the formula, check the cubic inches.

$$V = \pi r^2 h$$

$$V = \underset{\pi}{\underset{\downarrow}{3.14}} \times (\underset{r = \frac{1}{2}\text{ bore}}{\underset{\downarrow}{2.115}})^2 \times \underset{\text{stroke}}{\underset{\downarrow}{3.80}}$$

V = 9.________ cubic inches per cylinder

Cubic inch displacement for the engine is V x 8 = 10.______ which is approximately 427. Some error is due to rounding off π and the other decimal figures.

Paul then took another look at the formula $V = \pi r^2 h$ and tried to figure out what could be changed on the right side to reduce the volume (left side) to 366. π is a constant, always approximately 3.14. The radius (½ bore) or height (stroke) or both would have to be 11.__________ (increased/decreased). In other words, a combination of the two must be found that will fit in the formula to equal 366 cubic inches.

Try various combinations of lower stroke and/or bore. Be sure to use the formula correctly.

Now, with the specifications you listed to answer problems 7 and 8, check the manufacturer's listed cubic inch displacement by using the listed bore and stroke and the volume formula. 12. Cubic inches you get a.__________. The manufacturer's listed cubic inches are b.__________. Are they close to the same?

Paul met another man at Donnybrooke who follows the USAC Championship Trail (United State Auto Club). He said that USAC is Americas' answer to Europe's Formula I racing with some differences in engine size. There is also much more money involved in the American races. Another difference is that all races are run on oval tracks rather than highways and roadways as in Europe. Some of the facts pertaining to USAC are:

A. Engine size = 255 cubic inch (about four liters) if the engine has certain modifications but is not supercharged
183 cubic inch (about three liters) if supercharged
305 cubic inch (about 13.__________ liters) if the engine doesn't have modification of the 255 cubic inch or isn't supercharged

B. Cost of a USAC car is from $30,000 to $100,000.

C. Top speed is about 210 miles per hour, although most tracks only can accommodate 130 to 170 miles per hour.

D. Length of races varies from 50 to 500 miles.

The most famous USAC race is the Indianapolis 500. The winning car can win as much as $150,000. This race is run on a 2½ mile oval track -- one mile straightaway and one-fourth mile end sections. How many laps must the winner make? 14.______. How many miles in straightaway are there for the whole race? 15._________ Of end sections? 16._________

The driver would be racing with an engine putting out 475 to 600 horsepower. The Indy cars have a low gear, used only for coming out of the pits; then they're shifted to a high gear which is used throughout the race.

Paul's interest changed from the USAC and NASCAR racing back to Donnybrooke when the starting flag was dropped. The race was strictly for amateurs, with a $35 starting fee. One of Paul's teachers, Mr. Rounds, was entered and seemed to be having trouble on the straightaway at high speed. At the end of the race, Paul saw Mr. Rounds and asked what the trouble was. Mr. Rounds wasn't sure but he thought the dwell was probably set too low. One sure way of checking this is to use a dwell meter. This instrument measures the percent of time the points remain closed and converts this into a scaled reading which multiplies the percent of time by 360° divided by the number of cylinders in the engine. So the formula would be

$$\boxed{(\text{Time closed x } 360^\circ) \div \text{no. of cylinders}}$$

If the points are closed 2/3 of the time, the dwell reading would be (2/3 x 360°) -- 8, or 30° (rounded off for an eight-cylinder car). On a six-cylinder car, the reading would be 17._________.

If point dwell is excessive -- that is, the points remain closed too long -- too much current would flow through them at low engine RPM and arcing would occur to reduce point life. If the dwell is set too low, not enough current would flow in the coil at high speeds to provide sufficient spark to fire the plugs, thus poor high-speed performance. Mr. Rounds knew the dwell should be at 30°, so for his eight-cylinder car it should be closed two thirds of the time. He found they were closed only one half of the time, giving him a dwell reading of 18.__________.

Paul had always set his points by using a feeler gauge, but saw now that for high performance cars a precision instrument is much better. He also left Donnybrooke knowing a little more about the racing profession.

For more information on engine repair and tune-up, see unit 6-1, "Auto Mechanic."

CLUSTER SEVEN -- DRIVING OCCUPATIONS

Unit 2

Commercial Truck Driver

One of the first toys Rod could remember wanting as a small child was a semi-trailer. His dreams grew as he grew, and Rod could see himself as owner of an over-the-road truck after he got out of school. He was obsessed with this idea and spent considerable time investigating exactly what would be involved in owning his own firm. This was really no problem because Rod's cousin worked for a large trucking firm and had quite a bit of knowledge of such things as the costs involved.

To give you some idea of the costs involved, let's look at a few of the initial ones. First, the purchase of a reliable tractor. This might be new or a good used one; in most cases, it would be new. A good estimate is somewhere between $15,000 and $23,000 for a new tractor. The large price differential is because of the type of cab, the size and type of engine, the type of tires, and extras such as mirrors and chrome. There is also the cost of a trailer. This cost may range from $4,500 to $8,000 depending on the type of construction. Then there is the cost of licensing, which comes to about $1000 per year; other state permits, which may cost $250 to $500 per year additional; and insurance, which runs as high as $4,000 per year. Rod figured at these prohibitive costs it would be much better for him to get a job for a large established firm, and save until he could afford to buy a truck of his own.

Rod asked his cousin if he thought there were any driving positions open in his firm.

"You'll have to check with the management in the office. I really don't know."

"Should I call or just drop in sometime?" Rod asked.

"Oh, you'd better call ahead. Gotta put on a front, you know."

That afternoon Rod called to arrange for an appointment for the next day. The personnel manager implied there were some openings for good qualified drivers and asked him to come in.

Rod was early for the interview and spent some time looking at the trucks and talking to a few of the drivers.

During the interview, Rod discussed his interest in driving, his experience, and past record. Because of his age, having just graduated, he was told that it would be difficult for him to be put on a large truck.

"The driver should be 25 years old and have a good driving record," he was told. Also, a physical every two years was needed.

After the interview, Rod was told he could start on a small truck used for local deliveries. He still would be required to keep the same records as the drivers with more experience.

To help him get used to the record-keeping aspect of the job, Rod was given some sample problems to work out.

Try this pretest to see how well you can do on trucking problems.

Mileage problems. How many miles did the driver travel?

1. End of trip 076,918
   Start of trip 076,339

2. End of trip 000,327
   Start of trip 999,645

Salary problems. At 13½ cents per mile, find:

3. The wage paid for the trip in problem one
   $.13½ x ______ = ________

4. The wage paid for the trip in problem two
   $.13½ x ________ = _______

Time problems. A driver can drive only 10 hours in one stretch. Then he must rest eight hours. This is up to a maximum of 60 hours driving time per week.

Start at	8:00 a.m.
Stop for coffee	10:17 a.m.
Start after coffee	10:32 a.m.
Stop for lunch	12:35 p.m.
Start after lunch	1:05 p.m.
Stop for fuel and coffee	3:15 p.m.
Start after break	4:00 p.m.
Stop for supper	6:00 p.m.

Find total hours 5. ____________

Find lunch and break time 6. ________

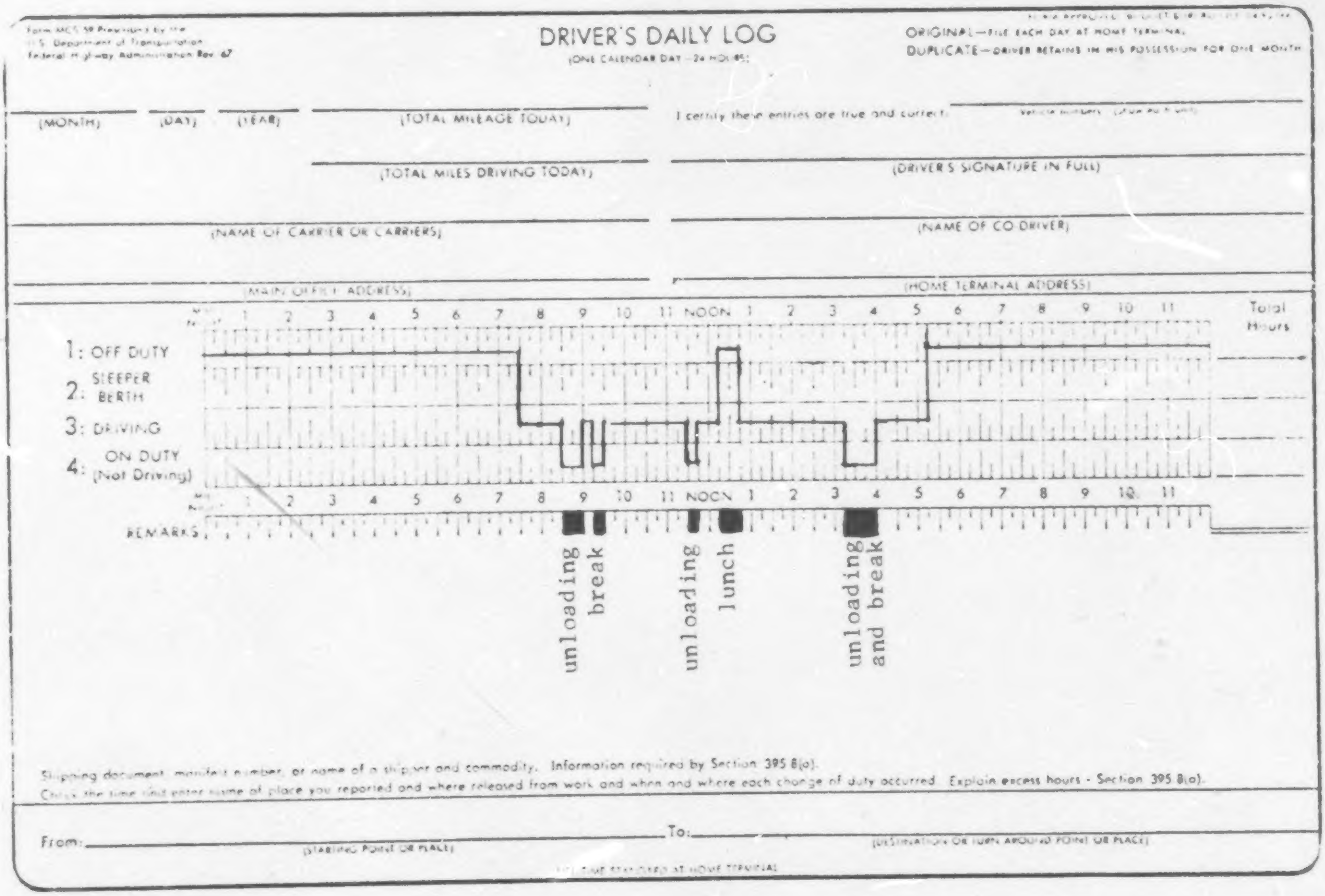
Find actual driving time 7. ________

8. $\begin{array}{r} 1{:}50 \text{ p.m.} \\ \underline{-9{:}30} \text{ a.m.} \end{array}$

9. $\begin{array}{r} 7{:}10 \text{ p.m.} \\ \underline{-6{:}55} \text{ a.m.} \end{array}$

Be sure to check with your teacher before going on.

A very important part of the job is filling out the log book.



Form MCS 59 Prescribed by the U.S. Department of Transportation Federal Highway Administration Rev. 67

DRIVER'S DAILY LOG

(ONE CALENDAR DAY – 24 HOURS)

ORIGINAL—FILE EACH DAY AT HOME TERMINAL

DUPLICATE—DRIVER RETAINS IN HIS POSSESSION FOR ONE MONTH

(MONTH) (DAY) (YEAR) (TOTAL MILEAGE TODAY)

I certify these entries are true and correct.

(TOTAL MILES DRIVING TODAY)

(DRIVER'S SIGNATURE IN FULL)

(NAME OF CARRIER OR CARRIERS)

(NAME OF CO-DRIVER)

(MAIN OFFICE ADDRESS)

(HOME TERMINAL ADDRESS)

unloading

break

unloading

lunch

unloading and break

Shipping document, manifest number, or name of a shipper and commodity. Information required by Section 395 8(o).

Check the time and enter name of place you reported and where released from work and when and where each change of duty occurred. Explain excess hours - Section 395 8(o).

From: ____________ (STARTING POINT OR PLACE) To: ____________ (DESTINATION OR TURN AROUND POINT OR PLACE)

On the log on p.3 you'll notice that Rod left the warehouse at 7:30 a.m. on his first delivery. He reached his first stop at 8:30, took one half hour to unload, drove to a coffee shop in 15 minutes and took a 15-minute break. To reach his next stop, Rod drove another two hours, arriving at 11:30 and was unloaded in 15 minutes. This was good timing! He drove to a small restaurant 30 minutes away and took 30 minutes for lunch. From the log we see that it took 10.______ hours to drive to the last stop. Here it took 11._____ minutes to unload and then he drove back to the warehouse. During the stop he was able to get coffee in the coffee shop next door. According to the log, what time did Rod get back to the warehouse? 12.______ p.m.

Rod gets paid an hourly rate of $4.73 and gets an overtime rate of $7.10 for each hour more than eight each day. All breaks are included in the eight hours, but subtract the lunch time. How much is Rod earning for the eight hours of regular time? 13._________ If he has earned any overtime, how many hours of overtime did he work? 14.________ hours. For the overtime, how much did he earn? 15._______ What were his wages for the day? 16._______

On the log sheets found in the back of this unit record the following days, using these times as Rod recorded them.

17. Monday	7:30 a.m.	Leave warehouse
	11:30 a.m.	Arrive at first stop
	12:00 noon	Drive to restaurant
	12:15 p.m.	Stop for lunch and fuel
	12:45 p.m.	Start for second stop
	3:45 p.m.	Arrive at second stop
	4:30 p.m.	Head back to warehouse
	6:00 p.m.	Stop at warehouse

What is the pay for Monday? (Be sure to figure in overtime.) 18._______

19. Tuesday	6:15 a.m.	Leave warehouse
	7:45 a.m.	Arrive first stop
	8:00 a.m.	Leave for second stop
	9:00 a.m.	Arrive for second stop
	9:30 a.m.	Leave for third stop
	10:00 a.m.)	Stop for coffee
	10:15 a.m.)	
	10:45 a.m.)	Arrive for third stop and
	11:15 a.m.)	wait for unloading
	11:45 a.m.	Leave for fourth stop
	12:15 p.m.)	Stop for lunch
	12:45 p.m.)	
	1:30 p.m.	Arrive for fourth stop
	2:15 p.m.	Leave for warehouse
	.30 p.m.	Stop at warehouse

What is the pay for Tuesday? 20.________

On Wednesday the foreman told Rod that he would be taking a trailer out on a long run. On trips like this, Rod would get paid by the mile. The rate is 13½ cents a mile plus one hour's pay for each stop. He had five stops and the mileage for the round trip was 1,162 miles. It took two days for the trip. He was also paid $20 petty cash for the overnight stay. What were his wages for Wednesday and Thursday, not including the petty cash? 21.__________

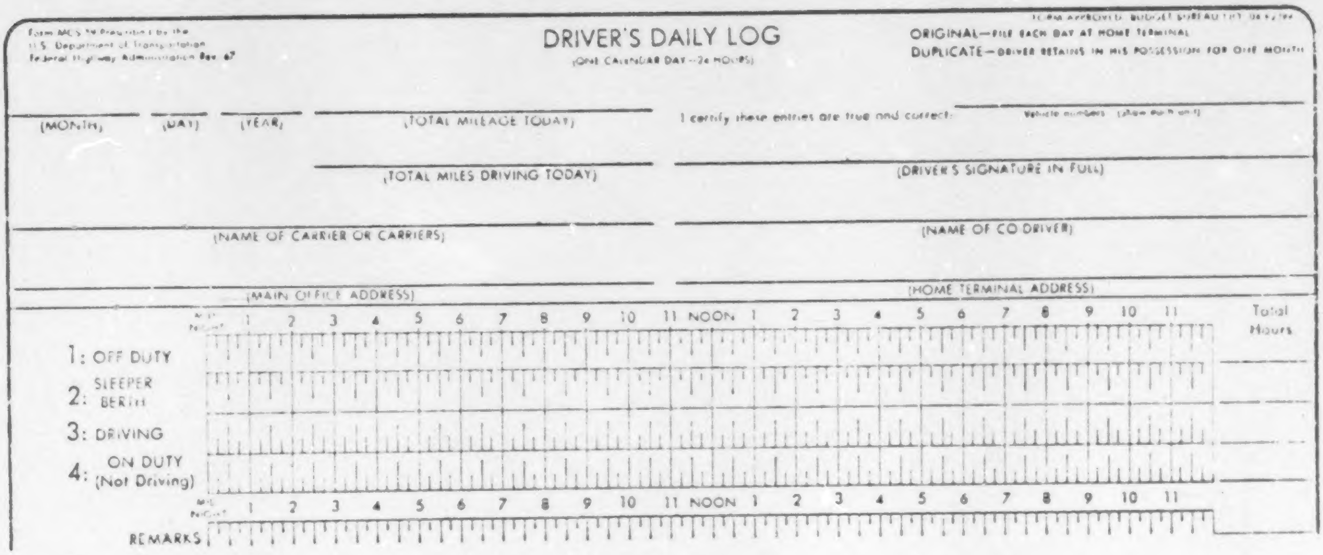
On Friday, Rod's truck was being loaded for a long trip the next week so he worked in the warehouse for the day. He was paid regular hourly pay for eight hours. What did this amount to? 22.________ What was Rod's total pay for the week? 23.__________

The deductions for the week were:

Federal income tax	$59.00
State income tax	17.10
FICA (Social Security tax)	16.15
Total deductions	__________
Net income (Total wages minus total deductions.)	

It would take several years for Rod to save enough money for him to purchase a tractor and trailer. However, Rod's goal was to do this, and with persistence and good fortune swinging his way, he would realize ownership of his own truck line.

17. Monday



Form MCS 59 Prescribed by the U.S. Department of Transportation Federal Highway Administration Rev. 67

FORM APPROVED BUDGET BUREAU [illegible]

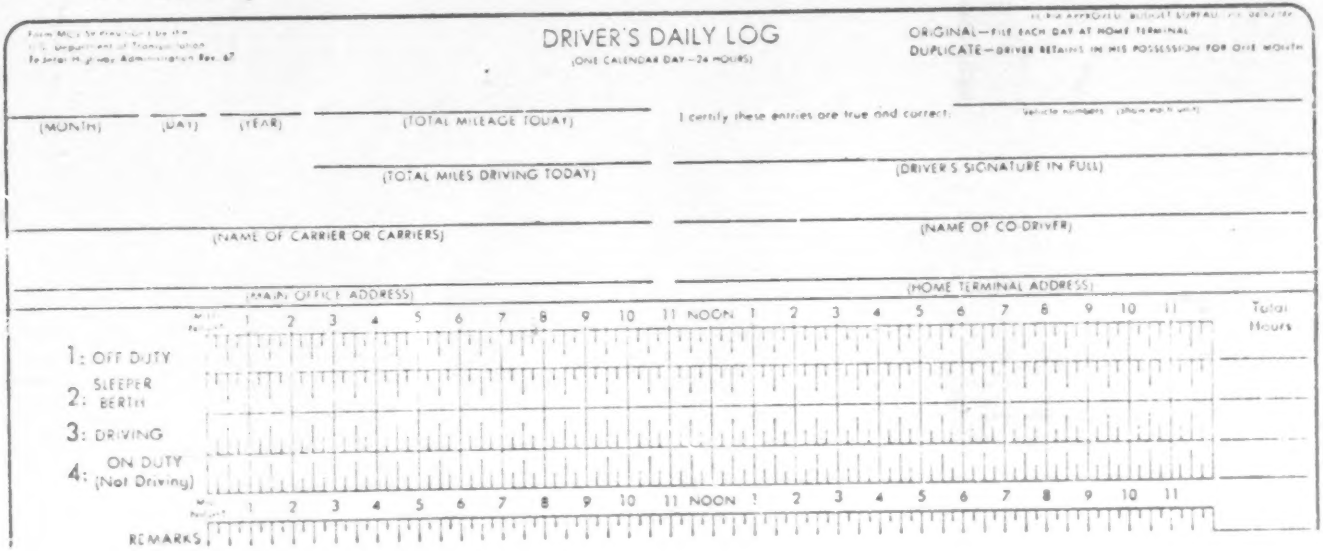
DRIVER'S DAILY LOG
(ONE CALENDAR DAY—24 HOURS)

ORIGINAL—FILE EACH DAY AT HOME TERMINAL
DUPLICATE—DRIVER RETAINS IN HIS POSSESSION FOR ONE MONTH

(MONTH) (DAY) (YEAR)
(TOTAL MILEAGE TODAY)
I certify these entries are true and correct:
Vehicle numbers (show each unit)
(TOTAL MILES DRIVING TODAY)
(DRIVER'S SIGNATURE IN FULL)
(NAME OF CARRIER OR CARRIERS)
(NAME OF CO-DRIVER)
(MAIN OFFICE ADDRESS)
(HOME TERMINAL ADDRESS)

MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 Total Hours
1: OFF DUTY
2: SLEEPER BERTH
3: DRIVING
4: ON DUTY (Not Driving)
MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11
REMARKS

19. Tuesday



Form MCS 59 Prescribed by the U.S. Department of Transportation Federal Highway Administration Rev. 67

FORM APPROVED BUDGET BUREAU [illegible]

DRIVER'S DAILY LOG
(ONE CALENDAR DAY—24 HOURS)

ORIGINAL—FILE EACH DAY AT HOME TERMINAL
DUPLICATE—DRIVER RETAINS IN HIS POSSESSION FOR ONE MONTH

(MONTH) (DAY) (YEAR)
(TOTAL MILEAGE TODAY)
I certify these entries are true and correct:
Vehicle numbers (show each unit)
(TOTAL MILES DRIVING TODAY)
(DRIVER'S SIGNATURE IN FULL)
(NAME OF CARRIER OR CARRIERS)
(NAME OF CO-DRIVER)
(MAIN OFFICE ADDRESS)
(HOME TERMINAL ADDRESS)

MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 Total Hours
1: OFF DUTY
2: SLEEPER BERTH
3: DRIVING
4: ON DUTY (Not Driving)
MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11
REMARKS

CLUSTER EIGHT -- PERSONAL SERVICES

Unit 1

Barber

If we consider all personal service professions, none have a more stable image than the barber. Its red and white spiraled pole rotating outside the shop is a very quiet and nonpolluting advertisement for a time of funloving chatter and relaxation. Even when the trend is to longer, uncut hair, the barbers seem to adjust to razor trims and styling.

The cost of haircuts varies greatly just in traveling from one end of a state to the other. In the larger metropolitan areas, the price of a haircut may be $3 and in small town shops only $2. The costs may vary but the pleasant optimistic attitude seems to prevail.

These facts attracted Bob to investigate the profession of barbering. He found that training was very important. A good vocational school is recommended. There are special schools a barber may attend to learn new trends and methods but basic barbering is all that is necessary.

Bob checked with barbers he and his father had gone to since his first haircut. "I'm interested in going to barbering school. Can you give me some tips on what is needed to operate a successful shop?"

"In any business you start on your own, there is the cost of overhead, repairs, and upkeep. These are things people forget."

"Do you think I should open a one chair shop myself or get a chair in an established shop like yours?" Bob asked the barber.

"Barbering is a business where you've got to build a group of customers. I strongly recommend starting in a larger established shop by renting a chair."

"What are some of the costs involved?"

"First let's look at some of the knowledge you'll need. You don't use math directly in cutting hair, but if you're interested in costs and income you need to know some basic math. The ability to get along with people is very important. Discuss -- never argue with a customer. Be happy, optimistic, and smile at every customer that darkens your door. Now, let's look at some problems you'll have to be able to work."

1. $$\begin{array}{r} \$28.10 \\ \$67.40 \\ \underline{\$\ 9.20} \end{array}$$

2. $$\begin{array}{r} \$2.50 \\ \underline{\times\ 14} \end{array}$$

3. $27\overline{)\$108.81}$

4. $$\begin{array}{r} \$97.62 \\ \underline{-\ \$89.78} \end{array}$$

5. $26\overline{)247}$

6. $$\begin{array}{r} \$28.62 \\ \$19.47 \\ \$82.18 \\ \$23.12 \\ \$10.96 \\ \underline{\$73.80} \end{array}$$

7. $$\begin{array}{r} \$110.76 \\ \underline{\times\ \ .50} \end{array}$$

8. $$\begin{array}{r} \$87.40 \\ \underline{\times\ .15} \end{array}$$

9. 14% of $18 = __________

10. 28% of $76.82 = _________

Be sure to check with your teacher before going on.

The average monthly rent of a chair in the shop Bob was at was $115. How much is this per day if most months have 22 work days? 11._________ (nearest cent). How many haircuts per day does it take at $3 each just to pay rent? 12._________ (nearest tenth).

A set of barber's tools costs approximately $204. This includes three shears, three cloths, three combs, three scissors, razor and strap, brush, and two smocks. The set depreciates (warrant) completely in two years. How much is this each month? 13._________ How much per work day? 14._________ (nearest cent). What part of a haircut is this? 15._________ (nearest tenth).

It costs an additional $13.20 per month for supplies. This includes oil, soap, shampoo, clothes, napkins, repairs, etc. How much is this per year? 16._________ How much per working day? 17._________ (nearest cent). What part of a haircut is this? 18._________ (nearest tenth).

Considering rent, tool investment, and supplies, how many haircuts per day are needed to pay expenses? 19.__________. This is 20.__________ (dollars).

Many barbers do 18 haircuts per day. At $3 per haircut this is 21.__________ per day. Using 22 workdays per month, how many workdays are there per year? 22.__________.

If a barber can average 15 haircuts per day, how much is this per day? 23.________ per month? 24.__________ per year? 25.__________.

From the above figures, how much does it cost per day for expenses? 26.__________ per month? 27.__________ per year? 28.__________.

How much does the barber clear each year, before taxes, if he cuts 15 haircuts per day? 29.__________.

Bob enjoyed going through the computations involved in the running of a shop. He could see several advantages in owning his own business and liked the idea of serving the public. His plans now are to start barbering school as soon as he graduates. He has decided to visit a couple schools and apply as soon as he can.

CLUSTER EIGHT -- PERSONAL SERVICES

Unit 2

Beautician--Cosmetologist

One of the more popular after school careers high school girls enter is that of a cosmetologist. The number of men entering the field is increasing, mostly in exclusive salons. The entry into this field must be through a cosmetology school. Sue had long wanted to be a beautician, so with school coming to a close she visited a local school of cosmetology.

At the school she met Mr. Swenson, the manager. He said the requirements for entering a school are minimal. The person must be at least 16 years old and, because his school was accredited, must be a high school graduate or on the cooperative program at high school. The cost of the course differed from school to school, and ranged from $500 to $750 for a 10- to 11-month course. One part of the course covered a wide range of subjects including scalp treatment, manicuring, hair cutting and styling, permanent waves, facial treatment, facial make up, tinting and bleaching, and electrolysis. The other part of the course dealt with the science of cosmetology which includes anatomy; skin, hair, and nails; disorders of scalp and hair; electricity; light therapy; chemistry; beauty salon management; and state laws.

Upon completion of the course the school would give a final examination. Sue thought that at that point the graduate of the school could start looking for a job. Mr. Swenson said that this is not so. The graduate must take the state license test given by the State Board of Hair Dressers. The test was a two-part examination. The first part lasted from 8:30 a.m. to 12 noon and was a practical test -- one where the potential operator must display ability as a cosmetologist. The second part was a written examination from 1 to 2:30 p.m., mainly on state laws. The initial cost of the test was about $6. The operator's license must be renewed each year.

If someone wished to manage a business as well as be an operator, a different license was issued. To become a manager, a person must have been an operator for at least one year and be 21 years old.

Mr. Swenson said that almost 90 percent of his graduates are placed by his school. The starting base weekly salary varied, but was usually $75 to $100. Commission on work done was 40 percent to 50 percent and figured on receipts above twice the base rate. For example, if an operator had a base rate of $75, she would not receive commission on the first $150 of receipts. If the base was $100, she would not receive commission on the first $200 in receipts.

The base guaranteed a wage each week and the commission setup added incentive to get and keep customers. Of course, any money in tips was kept wholly by the operator. So an average weekly wage was hard to determine because of differences in tips and commission. The range could be from the base to $300 per week.

Mr. Swenson gave Sue some sample operator earnings of graduates of his school. Figure the weekly earnings of each girl.

A. Cathy was hired with a base of $75 and 50 percent commission. On her fifth week on the job, she had daily receipts of $37, $35, $32, $3 $38, and $15 for a half day of work on Saturday.

1. Her gross weekly receipts were ________

2. The amount commission was based on ________

3. Amount of commission ________

Tips $12.50

4. Total week's salary and tips ________

B. Joan had been established in a highly successful salon for about two years. Her base pay was $85 per week and her commission 45 percent. A typical week's daily receipts were: Monday, $38; Tuesday, $45; Wednesday, $54; Thursday, $58; and Friday (she worked until 8 p.m.), $65. She received tips totaling $27.75.

5. Her gross weekly receipts were ________

6. The amount commission was based on ________

7. Amount of commission ________

Tips $ 27.75

8. Total week's salary and tips ________

C. About 90 percent of Mary's customers were regulars. Because of this she had a balanced schedule each day and was somewhat assured of each week's income. Her normal per day receipts for a week were: \$38, \$42, \$44, \$49, \$45, and \$21 for part-time on Saturday. Her base salary was \$90 per week and she received 50 percent commission. Her tips averaged \$21 each week.

9. Her gross weekly receipts were ________

10. The amount commission was based on ________

11. Amount of commission ________

Tips \$21.00

12. Total week's salary and tips ________

A few graduates eventually become owners or managers of salons. To become an owner requires a good deal of money for equipment and rent before the operation starts paying for itself. The amount needed depends on the size of the salon. Some people have started small businesses in their basements while others have large shops downtown. The overhead (rent, electricity, heat, insurance, telephone, water, equipment, etc.) has to be paid for out of receipts. The amount each operator takes in other than what makes up her salary and commission goes to the owner to meet expenses.

For example, in A, Cathy received \$192 in receipts for one week. Her wages were \$75 base pay plus \$21 commission (do not count tips, as none of this goes to the owner). So \$192 - \$96 = \$96 to the owner for expenses and supplies.

Receipts - (base + commission) = owner's share

Find what the owner would receive for expenses from B and C.

13. Owner's share of B is __________

14. Owner's share of C is __________

Sue asked if there were any salons in the vicinity that she could visit. Mr. Swenson said that there was a small one three blocks away and that one of his graduates managed the business. He called the shop for her and found that Renee, the manager would be pleased to meet with Sue. It was at the beauty salon that Sue was able to put all the things Mr. Swenson told her into context. She stayed for some time, watching the business in operation and getting added insights from Renee. She concluded that for a prospective cosmetologist to get an accurate picture of this type of work, she should visit a school of cosmetology to find the requirements, costs, and placement success as well as visit a beauty salon and ask the manager questions.

CLUSTER EIGHT -- PERSONAL SERVICES

Unit 3

Child Care

June had always loved little children -- in fact, some times she enjoyed her babysitting jobs so much she almost hated to take payment for them, a feeling she managed to overcome rather well. Because of this, she was overjoyed with the topic she chose for her social studies report. She was to investigate the mushrooming child care industry. Perhaps in the back of her mind, she was even thinking of eventually starting a child care center herself. Near June's home was such a center: the Child's Delight. It was conducted by Mr. and Mrs. Tom Waverly, and June thought it'd be interesting to interview them for her paper. She called for an interview and the Waverlys told her to come at 10 a.m. on a Saturday morning. This way the children would not be disturbed and they would be able to spend whatever time she needed to answer questions.

Because Saturday was bright and sunny, June was in a happy mood when she arrived at the Child's Delight. Mrs. Waverly noticed this and complemented her, since she considered this trait to be very important for anyone working with children.

June learned that in opening a child care center one had to be concerned with the strict state regulations. These regulations were definite specifications for everything from the actual working budget to the amount of space which had to be available.

As far as staff was concerned, the regulations said "There shall be a sufficient staff to insure adequate operation of the facility and its program." It further broke this down to mean that the ratio of children to staff shall not exceed 10 children to one staff person and that this person should be with the children at all times and free from housekeeping or working responsibility. Also, it was necessary that a responsible person should be readily available as a substitute when a staff member could not be in attendance. June learned that the staff/child ratio at Child's Delight was one to nine and that the substitute teacher ratio was three to one.

Knowing that Child's Delight was licensed for a maximum of 45 children, June calculated that they had a staff of 1.__________ full time people, with a "back-up" force of 2.__________ substitutes. On an average of four substitutes called per week, each substitute staff member was called about 3.__________ on an average. June remarked that this did not seem often enough to be worthwhile for these ladies and learned that most of them were only interested in helping occasionally or were regularly employed as substitutes for neighboring school districts.

The actual physical plant was also subject to regulations. At least two exits to ground level were needed for any floor where the children would be, and all outside doors must swing outward. There must be a minimum of 35 square feet of usable floor space per child, exclusive of hallways, bathrooms, lockers, kitchens, and floor space occupied by sanitary equipment. For a maximum of 45 children, this meant that Child's Delight had at least 4.__________ square feet. June measured and found that the room they were in was 20 feet wide. In order, then, to have the minimum square footage required, she knew that it had to be at least 5.__________ feet long (nearest foot).

State regulations also stipulated that "there shall be at least one toilet and one washbowl provided for each 15 children and one additional toilet and washbowl for each additional 15 children or fraction thereof." This meant that the Child's Delight had at least 6.__________ toilets and 7.__________ washbowls built child-size. When June inquired, she found that the Waverly's had five of each installed originally in order to take less time during mass usage periods.

"There must be a protected space equipped with a cot, sheets, and blanket set aside for isolation in case of illness." June wondered to herself that perhaps many of these regulations came about because of abuses on the part of unscrupulous people who had originally gotten into the child care business for the sole purpose of taking people's money.

Heating and ventilation were also required: "either a ventilating system or outside windows properly screened" was clearly stipulated. June was pleasantly surprised when she read "a minimum room temperature of 68° shall be maintained as measured at 24 inches above floor level," written undoubtedly with children in mind.

As if space inside the building wasn't sufficient, it was also necessary to provide a safely enclosed outside play area with at least 75 square feet of usable play space per child. Consequently, June knew that the Child's Delight had a minimum of 8.__________ square feet, or a space that measured 50 feet x 9.__________ feet.

Besides an investment in space available for the child care center, June could easily see that much money also was invested in the child-size furniture, play materials, and books which were used by all the children.

The daily program was set up to include both social activities (free play, quiet activities, group activities, and outdoor play) as well as routine activities (health inspection, rest periods, toileting, and mealtimes).

Child's Delight ran their program to correspond with the schedules of working mothers; they planned activities from 7:30 a.m. to 4:30 p.m., or a total of nine hours daily, five days a week. The children were expected to be fed before they arrived, so they had only one main meal at the child care center, although a mid-morning and mid-afternoon lunch were served just after play periods.

June was given a copy of the daily schedule with the percentages of the day allowed for each activity. She decided to find out just how many minutes each percentage amounted to and then figured out the actual time schedule for the Child's Delight.

		Start	End	Number of Minutes Each Activity
CHECK IN TIME		7:30 a.m.	- 7:50 a.m.	
Inside Group Games	(5%)	7:50 a.m.	- 8:15 a.m.	________
Health Inspection	(5%)	8:15 a.m.	- 8:40 a.m.	________
Quiet Activity	(8%)	8:40 a.m.	- 9:20 a.m.	________
Outside Play	(6%)	9:20 a.m.	- 9:50 a.m.	________
Class: My Family and World	(5%)	9:50 a.m.	-10:15 a.m.	________
Toileting	(4%)	10:15 a.m.	-10:35 a.m.	________
Inside: Free Play	(6%)	10:35 a.m.	-11:05 a.m.	________
Class: Food and What It Does for Me	(5%)	11:05 a.m.	-11:30 a.m.	________
Lunch Time	(6%)	11:30 a.m.	-12 noon	________
Exercise: Group Inside	(5%)	12 noon	-12:25 p.m.	________
Nap	(10%)	12:25 p.m.	- 1:15 p.m.	________
Reading	(7%)	1:15 p.m.	- 1:50 p.m.	________
Play-Learning Activity	(9%)	1:50 p.m.	- 2:35 p.m.	________
Class: Protecting Myself	(6%)	2:35 p.m.	- 3:05 p.m.	________
Outside Play	(6%)	3:05 p.m.	- 3:35 p.m.	________
Toileting	(4%)	3:35 p.m.	- 3:55 p.m.	________
Free Play	(3%)	3:55 p.m.	- 4:10 p.m.	________
CHECK OUT TIME		4:10 p.m.	- 4:30 p.m.	

June thought that what she had learned from the Waverly's was quite informative. In fact, she was sufficiently interested to look more seriously into such a career in the future, after her social studies report was long in the past, a pleasant thing to look forward to!

CLUSTER EIGHT -- PERSONAL SERVICE

Unit 4

Stewardess

Sue had been looking vacantly out of the window and thinking that nothing ever happened to her. She would get up in the morning, make breakfast, go to school, come home, have an evening meal with the family, occasionally have an evening out, and then retire. With slight variations, that comprised her day. So there she sat, feeling sorry for herself, when a plane punctured the stillness. "That's it!" Sue cried. "I'm going to work for the airlines!"

Rapidly her mind began dreaming up glamorous pictures of her beside a 747, greeting passengers as they embarked, then rising to emergencies while in flight; or having a dashing young businessman in first class take a special liking to her and ask for a date when they landed. She was excited as she began calling the different airlines to find out how one became a stewardess.

What she learned brought her back down to earth, however, for she found that she'd need to be 21 in addition to meeting the usual physical requirements. In fact, the only avenue open to her would be to go to one of the local airline schools and then learn the various skills needed to handle the ground work. She would need to be able to handle reservations, ticketing, fares, and many other duties necessary to running an airline.

Sue asked to have an interview with one of the personnel people at a large local airline. She found that most of her time in school would be occupied with how to deal with customers, the workings of a travel agency, and developing personality and poise. Since she would be dealing with the public, the manner in which she presented herself would be very important.

There were, Sue found, a few skills which she would need regardless of what position she would initially fill. These will be covered in the following.

Converting Time: For most flight information, flight time is given on a 24-hour clock. This is done by simply adding 12 hours if the 12-hour clock time is p.m., and leaving it alone if the 12-hour clock time is a.m. For instance, 8:39 a.m. becomes 0839 while 8:39 p.m. will be 2039, or 839 + 1200.

For practice, do the following:

1. Convert to a 24-hour clock
    - a. 8:49 p.m. __________
    - b. 12:40 a.m. __________
    - c. 12:05 p.m. __________
    - d. 4:05 a.m. __________
    - e. 11:30 a.m. __________
    - f. 1:05 a.m. __________
    - g. 11:20 p.m. __________
    - h. 6:40 p.m. __________
    - i. 8:20 p.m. __________
    - j. 12:30 a.m. __________
2. Convert to a 12-hour clock
    - a. 0049 __________
    - b. 1230 __________
    - c. 2020 __________
    - d. 1130 __________
    - e. 1745 __________
    - f. 2132 __________
    - g. 0408 __________
    - h. 1821 __________
    - i. 0005 __________
    - j. 0149 __________

Knowing Time Zone Differences

As an airline employee, Sue would have to know the difference in time zones. She found that the best way to know the difference between time zones is to express them all in terms of the number of hours from Greenwich Mean Time (GMT).

CLUSTER EIGHT -- PERSONAL SERVICE

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UNIT 8-4

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For practice, do the following:

1. Convert to a 24-hour clock
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    b. 12:40 a.m. ________
    c. 12:05 p.m. ________
    d. 4:05 a.m. ________
    e. 11:30 a.m. ________
    f. 1:05 a.m. ________
    g. 11:20 p.m. ________
    h. 6:40 p.m. ________
    i. 8:20 p.m. ________
    j. 12:30 a.m. ________
2. Convert to a 12-hour clock
    a. 0049 ________
    b. 1230 ________
    c. 2020 ________
    d. 1130 ________
    e. 1745 ________
    f. 2132 ________
    g. 0408 ________
    h. 1821 ________
    i. 0005 ________
    j. 0149 ________

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CLUSTER EIGHT -- PERSONAL SERVICES

Unit 5

Interior Decorator

"There is no better way to express your own personality than to build and mold it into the small things you do: the clothes you wear, the notebook you are making, the dress you're sewing, or the birdhouse you're building. Best and most expressive is your own room or even the house you are planning for your own family." These statements summarize what Dick's art teacher told the class one day last week as they were starting a unit on self expression.

The idea of personality expression in a house or even a room intrigued Dick. He talked to his art teacher after class and got the name of an interior decorator who had been in the business for several years. After school Dick went to the decorator's store and visited with him.

"When I am commissioned to do a job, I go to the customer's home and look at the house; then I just sit and visit for awhile to learn about the people. I discover their personalities and decorate the home specifically for them. If a close friend should see the results without the people there, he would know it was for them just by the way the house was decorated. Since no two couples have the same personality, no two homes should look exactly alike."

Dick was amazed at the involvement the decorator had with his clients. "Here I thought you showed your clients some ideas and tried to push some expensive things on them. It's a lot more complicated than that, isn't it?"

You're right. There is a lot involved, particularly for an operation the size of mine. Most of the larger firms subcontract their work out. I do all my own, so sometimes I'm an architect, carpenter, sheetrocker, finisher, painter, paper hanger, and consultant. Most of the people in large firms just consult."

"Your profession really interests me," Dick responded. "Do you have any information about schooling and training that I could read? Also, do you have some ideas of things that are needed all the time in your job?"

"Yes, I have several brochures about schooling and training. Probably the most important aspect of a profession like mine is service. You've got to love to help people and get to know them. After all, it's their home, not yours. So, the psychology of understanding people is priority one. Not far enough behind to even be called second is the importance of math computation. Then sharing the limelight is artistic ability in design and coordination."

"I can see why psychology and art are involved, but just what math do you need?" Dick asked.

The decorator sat down with Dick and finished an estimate he was working on. The short pretest that follows includes some problems from that estimate.

Addition

1.
19 1/2
22 3/4
10 1/2
6

2.
12 1/4
21
12 1/4
21

3.
13
12
9 3/4
21

4.
9 1/2
11 3/4
9 1/2
11 3/4

Multiplication

5.
28
x 8

6.
52 1/2
x 8

7. 19 3/4 x 7 1/2 = ________

8. $\begin{array}{r} 74 \\ \underline{\times\ 2.3} \end{array}$

9. $\begin{array}{r} \$8.95 \\ \underline{\times\ 14} \end{array}$

10. $\begin{array}{r} \$29.95 \\ \underline{\times\ 27} \end{array}$

Division

11. $36\overline{)170.2}$ (nearest hundredth)

12. $36\overline{)114}$ (nearest hundredth)

13. $9\overline{)266.63}$ (nearest hundredth)

14. $\frac{12 \times 18}{9} =$ __________

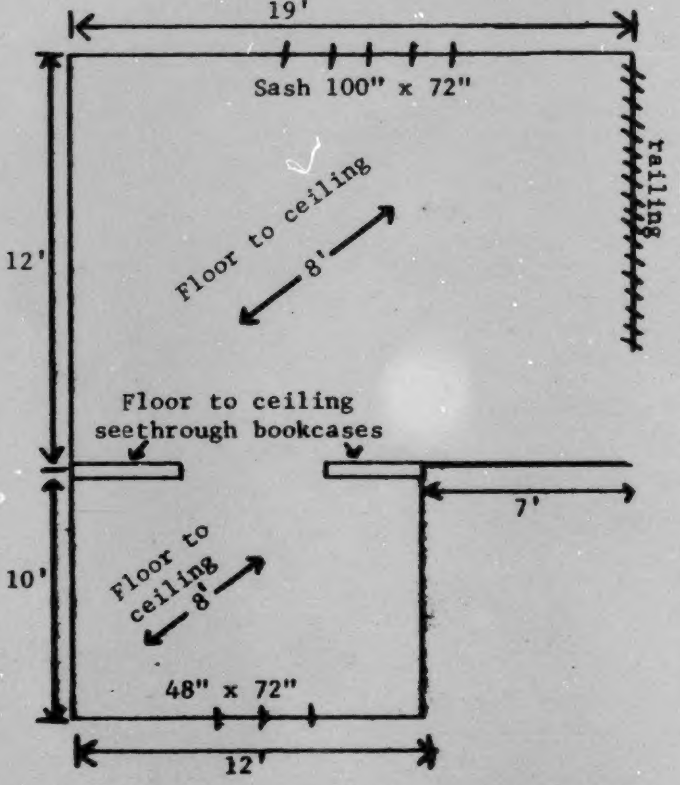
Be sure to see your instructor before going on.

After working on the estimate, Dick was convinced that math skills were important. "One small error could cost you several hundred dollars," he told the decorator.

During the short conversation that followed, Dick asked if there was an opening for him. The owner told him that normally in a one man shop, there were no openings. Becuase Dick had expressed such an interest in decorator work, particularly the service end of it, he would be hired on a part-time basis afternoons and Saturdays until school was out. During the summer he could work full time.

"You'll be going out with me on estimates and jobs. Even with my experience I'll probably learn a lot from your younger ideas."

Dick's first experience on the job was to help prepare an estimate on a dining-living room job. Dick measured the L-shaped room. He sketched it out on a scratch pad and marked down the dimensions.


19'
Sash 100" x 72"
railing
Floor to ceiling
8'
12'
Floor to ceiling
seethrough bookcases
7'
10'
Floor to ceiling
8'
48" x 72"
12'

There was no consultation on this job because the owner knew exactly what he wanted.

UNIT 8-5

What is the wall surface square footage of the living room? (subtract the window space) $(12 + 19 + 7) \times 8 - \left(\frac{100 \times 72}{144}\right) =$ 15.__________

First add the lengths of all the walls to be finished. Then multiply by the height of the walls. Now subtract the square footage of the window. Why do you divide by 144? 16.____

At 32 square feet per roll of wallpaper, how many rolls will this room take? 17.__________. Remember we can get half rolls for parts of rolls half or less but must use full rolls for over half.

The cost is \$9.95 per roll. What is the cost of the paper for the living room? 18.__________.

In the dining room the customer wants paper costing $10.50 per roll. What is the wall surface footage? 19.__________ (Follow the example for the dining room and be sure to subtract for the window but not the door.) How many rolls will be needed? 20.__________. What is the cost for the paper? 21.__________. What is the total paper cost for both rooms? 22.__________.

The paper hanging charge is $6.50 per roll. This includes all supplies, tools, etc. What will the paper hanging cost be? 23.__________. What is the total cost for the job? 24.__________. Be sure to include 3 percent sales tax on the wallpaper.

New carpeting is also needed for both rooms. What is the square footage of the floor space in both rooms? 25.__________ (Do not subtract for bookcases.) Change this to square yards by dividing by nine. 26.__________ (nearest tenth). Now, add 8 square yards for the hallway and stairway and use that total for the remaining calculations.

The cost of the carpet the customer wants is $9.75 per square yard. What is the cost of the carpet for the rooms, hall, and stairs? 27.__________. The cost of a carpet pad is $2.29 per square yard. What does the pad cost? 28.__________. Installation charge is $2.60 per square yard. This includes pad and carpet. What is the installation charge? 29.__________. Figure 3 percent sales tax on the carpet and pad. 30.__________. What is the total cost of carpet, pad, tax, and installation? 31.__________.

The customer also wanted new drapery. The total width to be covered was the window width plus 18 inches on each side. What would the width of the finished drape be for the living room? 32.__________, for the dining room? 33.__________.

The drapery would be hung floor to ceiling. There is 4 inches doubled hem (8 inches, on top and bottom and 2 inches allowed for shrinkage. The total height or length of the drapery is 8 feet + 34.__________ inches or 35.__________ feet. The drapery will require 2.3 times the width to be covered (finished width). This is 36.__________ inches (nearest inch) for the living room and 37.__________ inches (nearest inch) for the dining room. Using 42 inch wide material, how many pieces (widths) would be needed for the living room? 38.__________, for the dining room? 39.__________.

Any part of a piece is considered a whole piece. If 54 inch material is used, how many pieces are needed for the living room? 40.__________, for the dining room? 41.__________.

The material the customer chose comes only in 42 inch width. If a length is 9½ feet and 13 pieces are needed for both rooms, how many feet of material is this? 42.__________, how many yards? 43.__________ (nearest tenth). The material chosen costs $14.50 a yard. This comes to 44.__________. The lining for the drapery is $2 a yard and costs 45.__________.

Labor for making draperies is $6 per width for unlined and $7 per width for lined. There were 8 widths for the living room and 5 widths for the dining room. Since the drapery is lined, the labor cost is 46.__________. This labor cost also includes the hooks and weights.

What is the sales tax on the drapery? 47.__________. The total cost of the drapery including drapery material, lining, tax, and labor is 48.__________. What is the total cost of redecorating these two rooms? 49.__________.

There are many other services the decorator does for his client such as selecting and ordering accessories, pictures, and furniture. Dick was extremely pleased with this type of work. There was a lot of money to be made and he was utilizing a hobby at the same time.

CLUSTER NINE -- PERFORMING ARTS

Unit 1

Radio Announcer

By simply turning a switch on and selecting one of many stations, we can listen to exactly what we want whether it be rock, country western, soul, or folk. We've taken it all for granted for so long that we no longer appreciate the intricate technical work involved in putting just one song or musical piece on the air.

After doing some reading about radio stations and experimenting with a tape recorder, Arnie decided to tour one of the smaller local stations to get the feel of announcing.

He discovered that the smaller stations do not have engineers to set up the records, etc.; rather, the announcer does all his own. This becomes quite involved because it is difficult to be doing a live advertisement, selecting a record, and setting it up for an eight-second lead from introduction to voice -- all at the same time.

Arnie was able to spend some time talking to one of the announcers that was off duty and was told about the actual duties an announcer has. An announcer's day varies from station to station but normally is not much more than four hours per day. This may be split up into four parts or so, but in a lot of stations the person would work straight through.

An announcer has to be very alert and articulate. His or her voice tone is important but enunciation and clarity are of greater concern. The ability to add and subtract minutes and seconds must become second nature. To test your ability at this, do the following pretest.

UNIT 9-1

Addition

1. 2 min. 45 sec.
4 min. 12 sec.
1 min. 45 sec.
60 sec.

2. 15:47 (15 min. 47 sec.)
12:12
29:18
6:52

3. 5:00 news
3:17 record
0:25 talk
2:41 record
1:00 commercial

4. 15:00
2:47
8:54

Subtraction

5. 12:22
- 7:43

6. 1:47
-0:29

7. 59:26
- 9:27

8. 1:22
-0:08

Multiplication

9. a. 3 x $9.50 = ________
b. 2 x $40 = ________
c. 26 x $9 = ________
d. Total = ________

10. a. 26 x $13 = ________
b. 19 x $8.50 = ________
c. 25 x $12 = ________
d. 10 x $9.50 = ________
e. Total = ________

Check with your teacher before proceeding with the unit.

Arnie found out that an announcer uses math mostly in fitting a certain number of songs and commercials into a given unit of time.

If, during a 30-minute unit, only songs were to be played, how many songs could be played if each one was 2:50 in length and there was a 10" (" means second) space for introduction between songs? 11.__________.

During a scheduled half hour, there is a five-minute newscast, six minutes of commercials, and a 2½-minute sportscast. How much time is left for music and record introduction? 12.__________. If records average 2:45 a piece in length, how many songs, including a 10" introduction, could be played in the time left over? 13.__________ (Remember that you cannot play part of a song.) How much time will the songs take if each runs 2:45? 14.__________. Each song requires ten seconds voice introduction. How much time is this? 15.__________. The songs and voice total 16.__________. How much time is left of the music time? 17.__________. The announcer now must decide whether to find a short song or sell the time for an extra commercial. Which do you think would be the best to do?

In smaller stations such as the one Arnie visited, the head announcer is also in charge of selling time for commercials to the sponsors.

The top two tables are for program time and the bottom two tables are for one-minute or half-minute commercials.

COST OF COMMERCIALS

TIMES	1 HOUR	½ HOUR	¼ HOUR
1	140.00	85.00	50.00
13	132.00	75.00	45.00
26	125.00	70.00	42.00
52	118.00	68.00	40.00

TIMES	5 MIN.	1 MIN.	½ MIN.
1	27.00	13.00	10.00
13	26.00	12.50	9.50
26	24.00	12.00	9.00
52	23.00	11.50	8.50

CLASS "A" PACKAGE RATES

PER WEEK	1 MIN.	EACH	PER WEEK	½ MIN.	EACH
10 Times	110.00	11.00	10 Times	90.00	9.00
15 Times	150.00	10.00	15 Times	127.50	8.50
25 Times	225.00	9.00	25 Times	187.50	7.50
50 Times	400.00	8.00	50 Times	325.00	6.50

"AA" TRAFFIC HOURS

6 A.M. TO 9 A.M. — 4 P.M. TO 7 P.M.

PER WEEK	1 MIN.	EACH	PER WEEK	½ MIN.	EACH
10 Times	130.00	13.00	10 Times	105.00	10.50
15 Times	165.00	11.00	15 Times	135.00	9.00
25 Times	250.00	10.00	25 Times	200.00	8.00
50 Times	450.00	9.00	50 Times	350.00	7.00

What is the cost of 10 one-minute commercials per week scheduled from 4 p.m. to 7 p.m.? 18.__________.

What is this for each commercial?

19.__________.

What is the saving per one-minute commercial if 25 spots are sold per week?

20.__________.

What is the cost of a 30-minute "special" sold for 13 times? 21.__________.

Using the news chart at the right, what is the cost of a five-minute newscast given six times during "AA" time? 22.__________ (each) or 23.

23.__________ (for all six)

What is the cost for 12 2½-minute newscasts during "A" time? 24.__________ (for all 12).

News

		AA	A
5 MINUTES			
Opening and closing	6 Times	$15.00	$12.00
billboard and one	12 Times	12.00	10.00
60" announcement	18 Times	10.00	9.00
2½ MINUTES			
Opening and closing	6 Times	10.00	9.00
billboard and one	12 Times	9.00	8.00
30" announcement	18 Times	8.00	7.00

(Sportcast Carry News Rates)

An I.D. spot is 10" long and is given on the hour and half hour along with the station break. What would be the cost of 10 such spots per week for a year (52 weeks)? 25.__________.

I.D. SPOTS -- $5.00

Arnie's interest in radio helped him get a part-time job in programing at a local station. His desire is to be an announcer but that will come only as he proves himself proficient in lesser jobs.

CLUSTER NINE -- PERFORMING ARTS

Unit 2

Cameraman and Photography

"Buy yourself an inexpensive camera and become a photographer overnight." No doubt you've heard this statement over radio or television, or in a store from a salesperson. Of course, it's nice to take your own pictures and see the end result of your own efforts, but we do not become professionals by simply shooting our own pictures on a small camera.

Kim Raymon soon discovered this when he applied for jobs with the local newspaper and an advertising firm. He was told pointedly that jobs of this type required considerable experience and the best place to acquire this experience is in a vocational school.

Being in the school photography club had taught Kim much about the chemistry of photography and different film types. He was the yearbook photographer during his senior year and also ran the 16mm movie camera for ballgames. These responsibilities created an interest in the occupation of photo art, so Kim decided to further investigate careers involving this hobby.

Kim checked with the counseling office in his high school and got the names of the vocational schools in the area that offered photo art. One of the facts he learned from the interviews at these vocational schools was that it would be good for him to try to get a job at a large department store doing commercial photography so that he would be getting good on-the-job experience along with his schooling.

The next day Kim went to a large shopping center and applied for a job in the art and advertising department as a photographer. He got a job because he had considerable experience and understood the basic ideas of photography.

UNIT 9-2

Before going on, let's look at some of the basic mathematics Kim used in his job each and every day.

First, just regular addition:

1. 96
72
112
18

2. 1.92
10.86
9.02
15.95

3. 568
942
827
1952

Second, multiplication of fractions:

4. 1/2 x 1/4 = ____________

5. 3/8 x 5/16 = ____________

6. 5/6 x 8/15 = ____________

Third, subtraction of fractions:

7. 6 1/2
- 5 3/4

8. 7 3/4
- 5

9. 11.5
- 9.0

Fourth, multiple operations:

10. $\frac{36}{8 \times 1 \times 12}$ = ______________

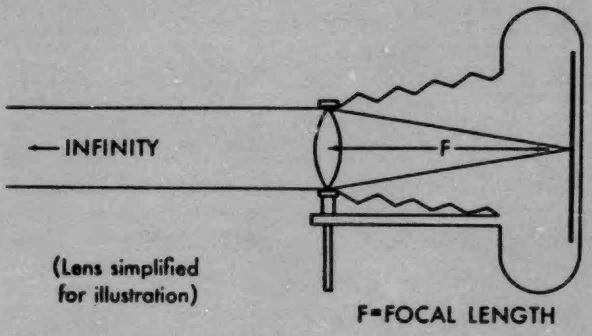
11. $\frac{75 \times 10}{75 + (10 - .5)}$ = ____________

12. $\dfrac{75 \times 10}{75 - (10 - .5)} =$ ______________

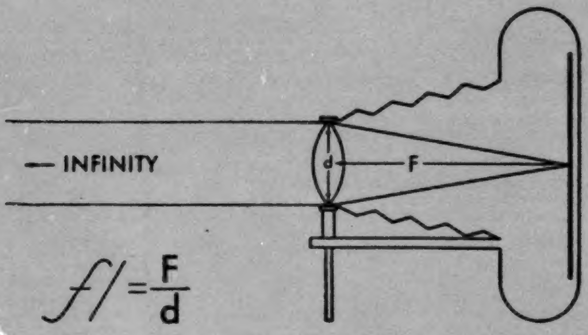
A few of the things that Kim works with every day are circle of confusion (abreviated as c.c.), hyperfocal distance, near point, far point, depth of field, focal length, and f-number.

1. The circle of confusion. The amount of "out-of-focus" that is tolerated before the picture is pronounced as unsharp.

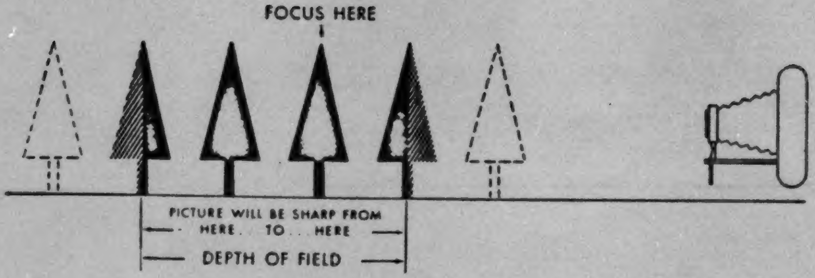
2. The focal length. The distance from the lens to the film plane (focal plane) where approaching rays are brought to a point by the lens, so that a sharp image is formed. A camera is generally fitted with a lens having a focal length roughly equal to the diagonal of the film used in that camera. The diagonal of a 2 1/4" x 3 1/4" film is slightly less than 4"; therefore, most 2 1/4" x 3 1/4" cameras are equipped with four-inch lenses.



3. f-number. This is the scientific way of stating the relationship which exists between the lens' opening and its focal length. The amount of light falling on the film depends on this relationship. This system provides a common standard for exposure calculations for all cameras and all conditions.



4. Hyperfocal Distance and Depth of Field.


FOCUS HERE
PICTURE WILL BE SHARP FROM
HERE... TO... HERE
DEPTH OF FIELD

Hyperfocal distance is a mathematical combination of the focal length, f-number, and the circle of confusion.

$$\text{Hyperfocal distance (in feet)} = \frac{\text{The focal length (in inches) multiplied by itself}}{\text{f-number x circle of confusion x 12}}$$

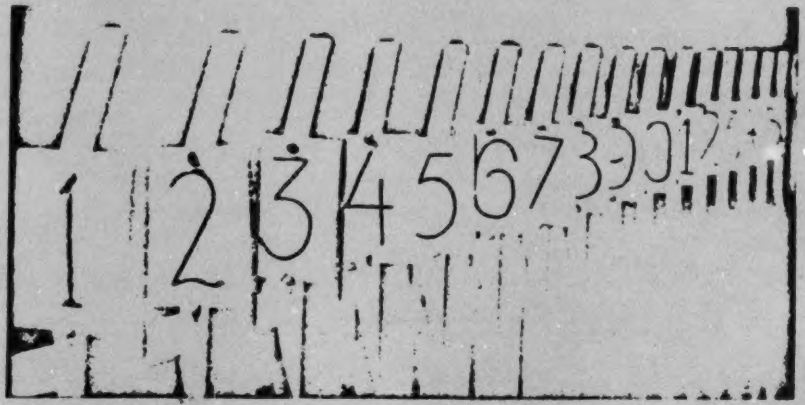
or

$$HF = \frac{F^2}{f \times c.c. \times 12}$$

Depth of field is quite well described by the diagram. Simply, it is the distance over which the picture will be sharp.

5. The near point is the closest point, where the picture is sharp and the far point is simply the farthest point of sharpness as shown below.

The near point would be three and the far point would be 11 in this experimental photo.


1 2 3 4 5 6 7 8 9 0 1

Calculations for the near point (NP) and far point (FP) are done with the following formulas:

$$NP = \frac{\text{Hyperfocal distance x (d) distance focused on (in feet)}}{\text{HF + (d - F(focal length in feet))}}$$

$$FP = \frac{HF \times d}{HF - (d - F)}$$

The following is a problem Kim had to work out for his job.

What is the depth of field when using a camera with a six-inch lens at f/8 focused at 10 feet and assuming a tolerable circle of confusion (c.c.) of 1/200 inch?

$$HF = \frac{F^2}{f \times c.c. \times 12}$$

$$HF = \frac{6 \times 6}{8 \times \frac{1}{200} \times 12} = \frac{36}{\frac{96}{200}} = 36 \times \frac{200}{96} = 75 \text{ feet}$$

$$\text{Near point} = \frac{75 \times 10}{75 + (10 - .5)} = \frac{750}{75 + 9.5} = 9 \text{ feet}$$

$$\text{Far point} = \frac{75 \times 10}{75 - (10 - .5)} = \frac{750}{65.5} = 11.5 \text{ feet}$$

Depth of field = far point - near point. Depth of field = 11.5 - 9 = 2.5 feet.

Another problem Kim worked on for his job was:

What is the depth of field when using a camera with a 4 inch lens at f/4 focused at eight feet and assuming a tolerable circle of confusion of 1/400 inch?

13. Use the above example to find the depth of field. ______________

In Kim's work there may seem to be a lot of quite needless worry about f/, probably because the symbol looks quite like one of those abstract symbols so dear to the hearts of higher mathematicians. The simple truth is this: f stands for focal length, the diagonal bar stands for a fraction and the numeral beyond the bar gives the fraction.

An f/8 lens is one whose widest opening has a diameter that measures 1/8 of its focal length. How would an f/4 lens compare with an f/8? An f/4 lens of the same focal length as the f/8 lens has an opening with twice the diameter as the f/8 lens. If the diameter is twice as great, then the area is four times as great and allows in four times as much light and is therefore four times faster than an f/8 lens.

Look at the following series of f numbers. As they progress from smaller to larger, the amount of light let in is cut in half by each successive setting.

f/1.0, 1.4, 2.0,2.8, 4.0, 5.6, 8, 11, 16, 22, 32, 45, 64

That is: an f/2.0 lets in half the light of an f/1.4; an f/5.6 gives twice the light of an f/8. What is the relationship between an f/2.8 and an f/5.6 14.____________ between an f/8 and an f/32? 15.____________

There is much more to be studied in photo art. Kim's job is one in which artistic ability for set-up is important. Learning to see indiscriminately, as the lens of a camera, is difficult and requires job experience.

Start with an inexpensive camera, set up a small dark room, read books, follow charts and most of all -- have fun.

UNIT 9-2

Following are some charts you can use in your own hobby of photography.

ACTION-STOPPING GUIDE

FOR SUBJECTS SUCH AS	DISTANCE FROM CAMERA	SHUTTER SPEEDS FOR SUBJECTS MOVING		
		DIRECTLY HEAD-ON	AT ABOUT 45°	AT ABOUT 90°
Pedestrians, construction work, most ordinary activities	25 feet	1/100	1/200	1/400
	50 feet	1/50	1/100	1/200
	100 feet	1/25	1/50	1/100
Most sports and more energetic activities	25 feet	1/200	1/400	1/1000
	50 feet	1/100	1/200	1/400
	100 feet	1/50	1/100	1/200
Fast cars, trains, planes, and other swift motion	25 feet	1/400	1/1000	......
	50 feet	1/200	1/400	1/1000
	100 feet	1/100	1/200	1/400

Pictures of People

	Suggested Action	*Lighting*	*Film*	*Paper*
Babies	Playing peek-a-boo in basket. – The first steps. – Sitting on blanket. – Playing with rattle.	*Back light with reflector.* If outdoors avoid strong sun in their eyes.	Fast Pan. For fast shutter speeds and soft contrast.	Smooth Semi-Matte
Youngsters	With toys and playthings in costumes and baseball outfits.	Almost full front light.	Pan.	Smooth Semi-Matte
High School and College Age	Sports participation with campus architecture as backgrounds. With books. – Hobbies.	Cross lighting. If it tends toward harshness try a reflector.	Pan. Make it a fine-grain Pan. if you use a miniature.	Almost any surface—depends upon subject. Use glossy paper for yearbook newspaper shots.
Middle Aged	Hobby picture such as golf – on picnics – with road maps fcr travel pictures.	Cross light for men. Front light for women.	Ortho for men. Pan. for women.	Medium rough semi-matte.
Older People	Action and expression to portray character.	Cross light for character studies. Diffuse light for women —this will soften skin texture.	Ortho for strength. Pan. for softness.	Texture papers either rough or med. rough.

SHUTTER SPEED AND LENS OPENING EQUIVALENTS OF EXPOSURE-VALUE NUMBERS

Exposure-Value Numbers	f/numbers							
	2	2.8	4	5.6	8	11	16	22
2	1							
3	1/2	1						
4	1/4	1/2	1					
5	1/8	1/4	1/2	1				
6	1/15	1/8	1/4	1/2	1			
7	1/30	1/15	1/8	1/4	1/2	1		
8	1/60	1/30	1/15	1/8	1/4	1/2	1	
9	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1
10	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
11	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4
12		1/500	1/250	1/125	1/60	1/30	1/15	1/8
13			1/500	1/250	1/125	1/60	1/30	1/15
14				1/500	1/250	1/125	1/60	1/30
15					1/500	1/250	1/125	1/60
16						1/500	1/250	1/125
17							1/500	1/250
18								1/500

Shutter Speeds

CLUSTER NINE -- PERFORMING ARTS

Unit 3

Musicians

One thing Bill had was a big mouth. If he'd learn to keep it shut more often, he wouldn't be putting himself in so much trouble. But when his friend Tom was playing saxophone the other day, something Bill couldn't do at all, Bill told Tom that he could play any instrument he wanted to. After all, it was just a matter of logic. Tom, who played by ear, maintained that if a person didn't have the proper spirit, he just wouldn't get anywhere at all. Since they were quite at odds on the subject, Bill left the scene with a resounding "I'll show you!"

He wasn't too happy about that because now he had to come up with something or eat crow and he didn't relish that idea. In order to get some idea of what music was all about, Bill decided to run down to see that master of the musical art, Mr. White.

Mr. White told Bill that music is essentially math that sounds. The internal structure of music lends itself to math very easily in a number of ways. Take the octave, for instance. The vibrations of notes one octave apart always occur in a two to one ratio. That is, a note one octave higher than a given note vibrates twice as fast as the given note. Other common "note separations" include the fifth, where notes are separated in a three to two ratio; the fourth, whose notes vibrate in a four to three ratio; and the major third, which vibrates in a five to four ratio. When Bill put these internal relationships in a chart, he noticed a definite order:

octave = 2/1 ratio
fifth = 1.________
fourth = 2.________
major third= 3.______

In fact, he noticed two things about the progression of the ratios involved:

4.__________ and 5.__________.

Mr. White told Bill that these were just the more common groupings, although other groupings existed.

Bill also learned that the counting or rhythm of music was mathematical. All music is based on time beats. 3/4 time means that the music has three beats per measure and the quarter note gets one beat.

Speaking of notes and their values, the basic note is the whole note; then the half note has half that value, etc. In addition, there are rests which have the same values as notes, beginning with whole rests, then half rests, etc. The whole rest means that there should be a period of silence for the same length of time as a whole note. All this is summarized in the following table:

	whole	half	quarter	eighth	sixteenth	32nd	64th	
Notes	𝅝	𝅗𝅥	𝅘𝅥	𝅘𝅥𝅮	𝅘𝅥𝅯	𝅘𝅥𝅰	𝅘𝅥𝅱	etc.
Rests	𝄻	𝄼	𝄽	𝄾	𝄿	𝅀	𝅁	

Now that Bill had all the note values, he found that it really wasn't too difficult to follow the type of rhythm that the particular music is to be played in. Knowing this, Mr. White gave him some rhythms and asked him what each meant. See what you can do.

Traditional

3/4 = 6.____

4/4 = 7.____

2/4 = 8.____

Contemporary

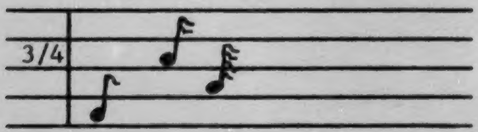
5/8 = 9.______________________________

7/8 = 10.______________________________

12/8= 11.______________________________

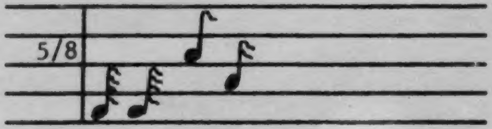
To see whether or not Bill really understood rhythm, Mr. White gave him a few sample rhythms, threw in a few notes, and asked Bill to complete the measure in the rhythm given, without bothering about the actual melody. Try these out for size:

12. Given

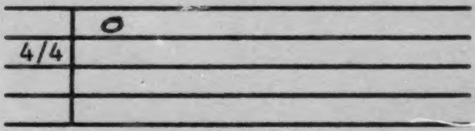


Complete the measure by inserting notes or rests which result in the measure having the rhythm indicated. Don't worry about the "aesthetic value" of your musical composition!

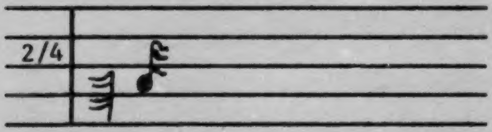
13.



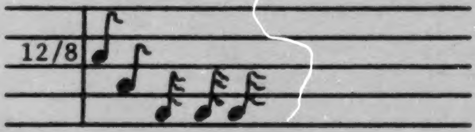
14.



15.



16.



What you just worked on is part of what a composer has to concern himself with when he writes the muscial score for a particular production or set of lyrics. In today's music, an added challenge lies in the fact that compositions have varying tempos within the main body of the work. This poses an additional challenge to the performing artist.

One of the many aids to students of music, Bill learned, was a device called a metronome, developed by a person named Maelzel. This is used especially to mark time for a person's practicing on musical instruments. It is a clocklike device with a pendulum that can be adjusted to tick at different speeds, determined by the position of an adjustable weight (the higher the weight on the pendulum, the slower the tempo). In music, the symbol M.M. = 120 means that the metronome will vibrate at 120 beats per minute. 180 = 17.______________ beats per minute; half as fast would be 18.________; 162 is a common speed, and can be considered to be very fast; 60 = 19.___________, and is slow. (Assume 4/4 time.)

Just as a sort of last minute review, Mr. White gave Bill a little quiz on the value of the different notes. See what you can do with them:

20. How many quarter notes in a whole note?____________

21. How many sixty-fourth notes are equivalent to three eigth notes?_________

22. In place of two quarter notes, use sixteenth notes. How many do you need?____________

23. Two quarter notes and four thirty-second notes would be equivalent to how many eighth notes?____________

24. 16 sixty-fourth notes and two whole notes could be replaced by how many sixteenth notes?___________

So, Bill thanked Mr. White for his help and decided to leave the music to his friend Tom. However, at least he learned that there was a great deal of math and logic in music.

CLUSTER NINE -- PERFORMING ARTS

Unit 4

Small Bands

Ever since Pat had attended Rosalie Elementary School in Bloomsdale he had tinkered with his brother's guitar. He became rather good at picking up tunes by ear. When he entered high school, he decided to take up the saxophone in earnest and play with the school band.

A few years later, Pat became associated with a group called "The Cooper Coppers," a five piece combo rather well known in the area. He found it time consuming, for they practiced three or four days a week for an hour or two a day in addition to their performances and individual practicing. Often they met for additional practice sessions as well. However, Pat didn't think this out of line, for the group was beginning to receive good fees and they were even cutting records. The extra time was the main reason for this success.

Each performer had his own instrument, but the group had to pay the cost of maintenance, transportation, and the amplifiers needed for a large hall. They discovered that as their fame grew, their equipment was insufficient. Consequently, they had to update it. They also thought it reasonable that when a member of the combo needed a new instrument, the group would pay a part of the cost, claiming it as an equipment expense. After much discussion, they decided to set up a fund to cover these expenses. One tenth of their fee seemed to be sufficient for this purpose.

For an evening's performance, the group generally received upwards of $400. The breakdown of this fee was

10% to their agent for booking and some managing

10% for overhead (transportation, maintenance, amplifiers, etc.)

20% for the leader

15% for each of the remaining four members of the five piece combo. Each member was expected to maintain membership in the Minneapolis Musicians Association Local 73 A.F. of M. The initiation fee was $123.50 and the yearly dues were $36. These were payable either quarterly or yearly. Since most people in small bands start off with not too much cash available, they usually preferred to pay their initiation fee by the quarter. Because $123.50 ÷ 4 is 1.__________ with a remainder of 2.__________, the first two quarterly payments would be 3.__________ and the last two quarterly payments would be 4.__________ each. The yearly dues they preferred to pay in one lump sum.

Pat was not the leader of the group, so he received the 15 percent commission after an evening's performance. To learn where the money goes, calculate where the fee goes for each of the following jobs:

5. Friday evening: Small job -- $400 fee; that would give a.________ for the agent, b.________ for overhead, c.________ for the leader, and d.__________ for each of the remaining four members.

6. Saturday evening they were booked from 8 p.m. to 1 a.m. for a fee of $625, which would be spread in this manner; agent a.________, overhead b._______, leader c.________, and others d.__________ .

7. In playing from 8 p.m. to 1 a.m., the combo plays for 45 minutes and then rests for 15 minutes. Based on this, the time actually spent playing is a.______. Since each performer worked five hours, their "hourly rates" for Saturday were b.__________ for the leader and c.__________ for the others.

8. One engagement caused problems. The group was hired for an 8 p.m. to 1 a.m. stretch for $600, and at the last minute one of the group took ill and had to be rushed to the hospital. They could not get a substitute for him so they fell subject to a 40 percent penalty clause, meaning they would be paid 40 percent less or a.________ for the evening. The agent's fee, however, still remained 10 percent of the original booking price, which means he still was paid b._________. This left only c._________ to be divided in the usual manner.

d. Overhead: 10% of 360 = ______________

e. Leader: 20% of 360 = ______________

f. Member: 15% of 360 = ______________

Since there were three members, that amounted to g.__________ , add the overhead, leader, and agent costs of h.__________. This gives a total of i._________. Subtracting this total from $360 leaves j._________ , which was divided among the four of them equally. This means that the leader made k.________ that evening and the other three l.__________.

Since the Cooper Coppers had made a name for themselves, they were also making recordings of their music. They first had to tape their songs and then the actual records would be cut from these tapes. After a few trial runs, they found that it was important to know how much time they had to tape a song. For this, they must know the length of tape being used and the speed the tape is being run. For example, if a 1,200-foot tape was being run at 15 inches per second (ips), three things would have to be done to find the amount of time available:

I. Change tape length to inches: 1,200 x 12 = 9.__________ inches.

II. Divide length by rate: 10.________ inches ÷ 15 ips = 11._________ seconds.

III. Convert time to minutes and seconds: 12.________ seconds ÷ 60 =
13.__________ minutes, 14.__________ seconds.

Using the above method, find the amount of time available when the following length tapes are played at the speeds indicated:

15. 7 1/2 ips and 1,800-foot tape: playing time = ______minutes ______seconds
16. 3 3/4 ips and 2,400-foot tape: playing time = ______minutes ______seconds
17. 1 7/8 ips and 600-foot tape: playing time = ______minutes ______seconds
18. 15 ips and 6,400-foot tape: playing time = ______minutes ______seconds
19. 3 3/4 ips and 600-foot tape: playing time = ______minutes ______seconds

(work space on following page)

7. In playing from 8 p.m. to 1 a.m., the combo plays for 45 minutes and then rests for 15 minutes. Based on this, the time actually spent playing is a.______. Since each performer worked five hours, their "hourly rates" for Saturday were b.__________ for the leader and c.__________ for the others.

8. One engagement caused problems. The group was hired for an 8 p.m. to 1 a.m. stretch for $600, and at the last minute one of the group took ill and had to be rushed to the hospital. They could not get a substitute for him so they fell subject to a 40 percent penalty clause, meaning they would be paid 40 percent less or a.________ for the evening. The agent's fee, however, still remained 10 percent of the original booking price, which means he still was paid b._________. This left only c._________ to be divided in the usual manner.

d. Overhead: 10% of 360 = ______________

e. Leader: 20% of 360 = ______________

f. Member: 15% of 360 = ______________

Since there were three members, that amounted to g.__________ , add the overhead, leader, and agent costs of h.__________. This gives a total of i._________. Subtracting this total from $360 leaves j._________ , which was divided among the four of them equally. This means that the leader made k.________ that evening and the other three l.__________.

Since the Cooper Coppers had made a name for themselves, they were also making recordings of their music. They first had to tape their songs and then the actual records would be cut from these tapes. After a few trial runs, they found that it was important to know how much time they had to tape a song. For this, they must know the length of tape being used and the speed the tape is being run. For example, if a 1,200-foot tape was being run at 15 inches per second (ips), three things would have to be done to find the amount of time available:

I. Change tape length to inches: 1,200 x 12 = 9.__________ inches.

II. Divide length by rate: 10.________ inches ÷ 15 ips = 11._________ seconds.

III. Convert time to minutes and seconds: 12.________ seconds ÷ 60 =
13.__________ minutes, 14.__________ seconds.

Using the above method, find the amount of time available when the following length tapes are played at the speeds indicated:

15. 7 1/2 ips and 1,800-foot tape: playing time = ______minutes ______seconds
16. 3 3/4 ips and 2,400-foot tape: playing time = ______minutes ______seconds
17. 1 7/8 ips and 600-foot tape: playing time = ______minutes ______seconds
18. 15 ips and 6,400-foot tape: playing time = ______minutes ______seconds
19. 3 3/4 ips and 600-foot tape: playing time = ______minutes ______seconds

(work space on following page)

CLUSTER NINE -- PERFORMING ARTS

Unit 5

Artist -- Commercial and Regular

> "The artists must be sacrificed to their art. Like the bees, they must put their lives into the sting they give."
>
> Ralph Waldo Emerson

"No other profession probably commands more dedication and devotion than does that of the artist, be it music, painting, writing, teaching, counseling, or plumbing." This statement contains a bit of irony but we must be careful to remember that each person, devoted to his task, is an artist.

Paul was concerned when he read the above sentences. He wanted to go into art as a profession and felt it had a name all its own. "Only those who create on canvas are artists," was a phrase he was familiar with. The concern vanished when he found there were many different professions just among those who "create on canvas."

Investigation showed Paul that the area of art which was most diversified and included most of the different media was commercial. He decided to look into this area and contacted a local agency for an interview.

There was no pre-employment test but he had to supply a list of references that included his art and industrial arts teachers. He was asked about how well he knew ratios and percents and if he could calculate areas and do layout work.

UNIT 9-5

Try this pretest to see how well you do on the math involved in commercial art.

Addition

1. $$\begin{array}{r} 12 \\ 27 \\ 96 \\ 114 \\ \underline{17} \end{array}$$

2. $$\begin{array}{r} 86 \\ 97 \\ 192 \\ 83 \\ \underline{10} \end{array}$$

3. $$\begin{array}{r} \$91.86 \\ 19.27 \\ 28.10 \\ 82.15 \\ \underline{1.75} \end{array}$$

Multiplication

4. $$\begin{array}{r} 18 \\ \underline{\times\ 1.5} \end{array}$$

5. $$\begin{array}{r} 1.75 \\ \underline{\times\ 5} \end{array}$$

6. $$\begin{array}{r} 24 \\ \underline{\times\ 1.3} \end{array}$$

7. $$\begin{array}{r} \$19.26 \\ \underline{\times\ .35} \end{array}$$

8. 175% of 10 is __________

9. 175% of 18 is __________

10. Area of 24" x 36" poster is __________ square inches.

11. Area of 8' x 10' wall is __________ square feet.

12. Change 4608 square inches to square feet __________ square feet.

13. Find the area of a 10 inch by 1½ foot poster (in square feet) __________

Ratios and Proportion

14. $\frac{3}{4} = \frac{\_\_}{16}$ 15. $\frac{5}{7} = \frac{\_\_}{35}$ 16. $\frac{9}{16} = \frac{\_\_}{50}$

Check with your teacher before going on.

Paul was hired and started the following week. His first job was to set up the enlarger to enlarge the following photos.

17. 2" by 2½" negative to 8" by 10" print

How many times the original negative's width will the print's width be? a.__________ the length's? b.__________. This magnification is called a 400 percent direct enlargement.

For an enlargement to be direct, the width and length must be multiplied by the same factor.

18. Enlarge directly a 5" by 7" negative by 150 percent, a.__________; by 167 percent, b.__________; by 200 percent, c.__________.

19. 2" by 2¼" negative is to be enlarged directly to fit a 16" by 27" frame. The width will be increased by a.__________ and the length by b.__________. Will this be possible? c.__________

Paul put this job aside for later when he could get help from someone.

20. Enlarge the following photos directly according to the percentages given.

a. 4" x 5" by 175% ______________

b. 10" x 14" by 166% ____________

c. 2" x 2¼" by 525% _____________

d. 8" x 10" by 333% ______________

Sometimes the negative to be enlarged cannot be enlarged directly, as in number 19 above. When this happens, cropping must be done. This involves cutting off part of the picture, either length or width, so that it can be enlarged directly to the desired dimensions. Let's consider problem 19 again.

A 2" x 2¼" negative is to be enlarged to fit a 16" x 27" frame. The width will have to be cut down so that the factor will be 12. (You must always change the dimension with the smaller factor to the larger factor.) If the print is to be 16 inches wide and have a factor of 12, we divide 16 by 12 to find the new width of the negative.

21. 16 ÷ 12 = __________

Crop these negatives to work with for the desired dimensions.

22. 2" x 2½" enlarged to 6" x 6"

Crop length to __________

23. 4" x 5" enlarged to 12" x 17"

Crop width to __________

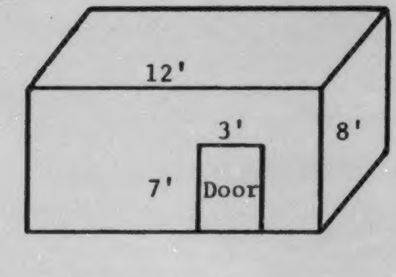
24. 5" x 7" enlarged to 16" x 28"

Crop width to __________

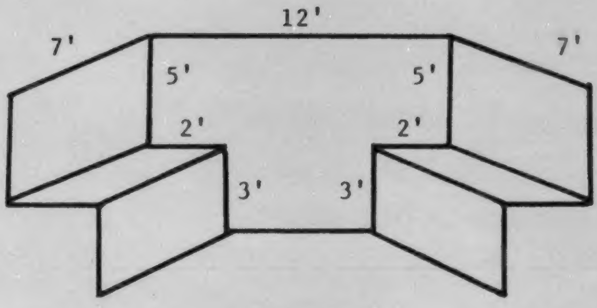
Arrangement of displays is another of Paul's duties. Customers supply material or ideas for materials and Paul's job is to make an attractive display for booths at conventions or for storefronts.

His main concern is to have his arrangement promote or sell an idea and to do this he is involved in making the best use of the space available. This requires an ability to figure the area the displays would require and find the total area he had available to use.

Find the areas of these spaces for displays.



25. Area is __________ square feet



Do not count shelf space but figure all wall space. Area is 26.__________ square feet.

Commercial artists are allowed to use their own ideas and innovations. This was exactly what Paul was looking for in a job.

CLUSTER TEN -- GOVERNMENT JOBS

Unit 1

Mailman

One of the most common responses a child gives to the question, "What would you like to do when you grow up?" is "Mailman." The probable reason for this is that we see them more often than people in other occupations. So when Dick was talking to one of his teachers, Mr. Johnson, about various jobs and mentioned a mail carrier career, Mr. Johnson asked if he really knew what the job entailed. Dick gave the obvious answer. "They deliver mail." Mr. Johnson suggested he visit the local branch of the post office to get a more complete picture.

At the post office he met Mr. Olson, the superintendent. Mr. Olson explained to Dick that in order to enter this career, a person must call for application papers, which include a driving record, and then must take a Civil Service test that consists of three parts. The longest part is a general intelligence test that includes questions on arithmetic, spelling, vocabulary, and reading comprehension. Another part consists of reading accuracy, where the applicant compares addresses arranged in pairs and indicates differences or likenesses. The third section tests the applicant's ability to follow instructions in making charges or routing mail.

Some sample questions from the test follow. These are actual sample items.

For each number series question there is at the left a series of numbers which follow some definite order and at the right five sets of two numbers each. You are to look at the numbers in the series at the left and find out what order they follow. Then decide what the next two numbers in that series would be if the same order were continued. Mark your answers on the Sample Answer Sheet on page 3

A. 1 2 3 4 5 6 7. . . A) 1 2 B) 5 6 C) 8 9 D) 4 5 E) 7 8

The numbers in this series are increasing by 1. If the series were continued for two more numbers, it would read: 1 2 3 4 5 6 7 8 9. Therefore the correct answer is 8 and 9, and you should have darkened C for question A.

B. 15 14 13 12 11 10 9 . . . A) 2 1 B) 17 16 C) 8 9 D) 8 7 E) 9 8

The numbers in this series are decreasing by 1. If the series were continued for two more numbers, it would read: 15 14 13 12 11 10 9 8 7. Therefore the correct answer is 8 and 7, and you should have darkened D for question B.

C. 20 20 21 21 22 22 23 . . . A) 23 23 B) 23 24 C) 19 19 D) 22 23 E) 21 22

Each number in this series is repeated and then increased by 1. If the series were continued for two more numbers, it would read: 20 20 21 21 22 22 23 23 24. Therefo. the correct answer is 23 and 24, and you should have darkened B for question C.

D. 17 3 17 4 17 5 17 . . . A) 6 17 B) 6 7 C) 17 6 D) 5 6 E) 17 7

This series is the number 17 separated by numbers increasing by 1, beginning with the number 3. If the series were continued for two more numbers, it would read: 17 3 17 4 17 5 17 6 17. Therefore the correct answer is 6 and 17, and you should have darkened A for question D.

E. 1 2 4 5 7 8 10 . . . A) 11 12 B) 12 14 C) 10 13 D) 12 13 E) 11 13

The numbers in this series are increasing first by 1 (plus 1) and then by 2 (plus 2). If the series were continued for two more numbers, it would read: 1 2 4 5 7 8 10 (plus 1) 11 (plus 2) 13. Therefore the correct answer is 11 and 13, and you should have darkened E for question E.

UNIT 10-1

Now read and work sample questions 1 through 5 and mark your answers on the Sample Answer Sheet.

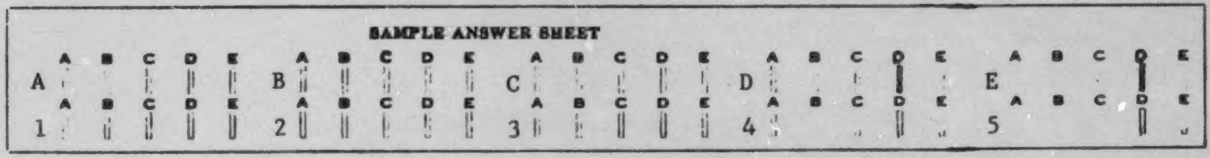
1. 21 21 20 20 19 19 18........... A) 18 18 B) 18 17 C) 17 18 D) 17 17 E) 18 19

2. 1 22 1 23 1 24 1............... A) 26 1 B) 25 26 C) 25 1 D) 1 26 E) 1 25

3. 1 20 3 19 5 18 7............... A) 8 9 B) 8 17 C) 17 10 D) 17 9 E) 9 18

4. 4 7 10 13 16 19 22............. A) 23 26 B) 25 27 C) 25 26 D) 25 28 E) 24 27

5. 30 2 28 4 26 6 24.............. A) 23 9 B) 26 8 C) 8 9 D) 26 22 E) 8 22



These are the explanations for questions 1 through 5.

1. Each number in the series repeats itself and then decreases by 1 or minus 1;

   21 (repeat) 21 (minus 1) 20 (repeat) 20 (minus 1) 19 (repeat) 19 (minus 1)

   18 (repeat) ? (minus 1) ?

2. The number 1 is separated by numbers which begin with 22 and increase by 1;

   1 22 1 (increase 22 by 1) 23 1 (increase 23 by 1) 24 1 (increase 24 by 1) ?

3. This is best explained by two alternating series--one series starts with 1 and increases by 2 or plus 2; the other series starts with 20 and decreases by 1 or minus 1.

   1 3 5 7 ?
   20 19 18 ?

4. This series of numbers increases by 3 (plus 3) beginning with the first number--

   4 7 10 13 16 19 22 ? ?

5. Look for two alternating series--one series starts with 30 and decreases by 2 (minus 2); the other series starts with 2 and increases by 2 (plus 2).

UNIT 10-1

Now try questions 6 to 13.

6. 5 6 20 7 8 19 9.................. A) 10 18 B) 18 17 C) 10 17 D) 18 19 E) 10 11

7. 9 10 1 11 12 2 13................ A) 2 14 B) 3 14 C) 14 3 D) 14 15 E) 14 1

8. 4 6 9 11 14 16 19................ A) 21 24 B) 22 25 C) 20 22 D) 21 23 E) 22 24

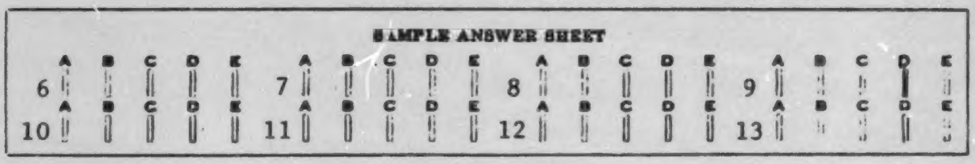
9. 8 8 1 10 10 3 12................. A) 13 13 B) 12 5 C) 12 4 D) 13 5 E) 4 12

10. 14 1 2 15 3 4 16................ A) 5 16 B) 6 7 C) 5 17 D) 5 6 E) 17 5

11. 10 12 50 15 17 50 20............ A) 50 21 B) 21 50 C) 50 22 D) 22 50 E) 22 24

12. 1 2 3 50 4 5 6 51 7 8........... A) 9 10 B) 9 52 C) 51 10 D) 10 52 E) 10 50

13. 20 21 23 24 27 28 32 33 38 39.... A) 45 46 B) 45 52 C) 44 45 D) 44 49 E) 40 46



Check with your teacher before you do the rest of the unit.

These tests are given only when the need arises. At certain times, a backlog of thousands of names may be waiting to be hired. The applicants are ranked according to scores on the test and interviews.

Dick wanted to know about a carrier's typical day. Mr. Olson said that this varies considerably; however, he would show Dick what might be an "average" day's timetable. The superintendent took Dick into the back of the station to show him the carriers' work area. Each carrier reported at 6 a.m. to sort his mail. He would get a bundle of mail from the dispatcher and would have to sort this into slots assigned for each house address. Registered mail, C.O.D., postage due material, and mail needing to be forwarded take special care and time. This entire process in the office would take about three hours, but may take as long as four hours. The mail was then bundled by area in parcels weighing not more than 35 pounds. These bundles were loaded into the carrier's mail car (or another vehicle), and dropped off on the carrier's route. The rest of the carrier's day (until 2:30 p.m.) would be spent delivering mail.

The area of which Mr. Olson was the superintendent had approximately 120,000 residents and 32,000 deliveries. This would mean an average of 14.__________ persons per delivery (mail drop).

The branch employed 96 carriers which meant each carrier had an average of 15.__________ deliveries (mail drops).

This was only an average. Some may have many more deliveries, as is true if a carrier has many apartment buildings, because less walking is necessary. One stop may serve 25 different apartments; therefore, more deliveries can be made in less time. A time study was made of each route to assure the proper amount of deliveries for each man's day.

The postal clerk, the man you see waiting on customers in the station, must be abl to utilize various charts and tables for proper delivery and be able to figure the rates for various mail. The postal clerk and the carrier start at the same pay, about $3.80 per hour (1971). Dick met Mr. Peron, one of the clerks. He explained that there are basically four classes of mail most customers will utilize. Each one is handled and delivered differently. First class mail would be all the letters and post cards we normally send. Second class mail could be newspapers and magazines. Third class is usually books, circulars, catalogs, other types of printed matter, merchandise, seeds, etc., weighing less than 16 ounces. Fourth class mail would entail packages of one pound and over. Priority mail (heavy pieces) should not be confused with fourth class parcel post, as it is handled on a priority basis -- faster and with more care. Air mail rates are slightly higher. Packages may be insured for loss or theft. Any mail may be registered, which means the carrier will have to fill out a receipt form when the mail is delivered. The sender can request, but must pay for, a return receipt showing to whom, when, and where the mail was delivered.

Following these charts, given to Dick by Mr. Peron, are some sample problems to see if he could use the tables correctly.

PRIORITY MAIL
(HEAVY PIECES)

Weight over 8 ounces and not exceeding: (Lbs.)	RATE					
	Local Zones 1, 2, and 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
1....	1.00	1.00	1.00	1.00	1.00	1.00
1-½..	1.20	1.22	1.25	1.30	1.40	1.50
2....	1.40	1.43	1.51	1.60	1.68	1.77
2-½..	1.60	1.65	1.76	1.90	2.02	2.16
3....	1.80	1.86	2.01	2.20	2.36	2.54
3-½..	2.00	2.08	2.26	2.49	2.69	2.93
4....	2.20	2.30	2.52	2.79	3.03	3.31
4-½..	2.40	2.51	2.77	3.09	3.37	3.70
5....	2.60	2.73	3.02	3.39	3.71	4.08
6....	3.08	3.23	3.58	4.03	4.43	4.88
7....	3.56	3.73	4.14	4.67	5.15	5.68
8....	4.04	4.23	4.70	5.31	5.87	6.48
9....	4.52	4.73	5.26	5.95	6.59	7.28
10....	5.00	5.23	5.82	6.59	7.31	8.08
11....	5.48	5.73	6.38	7.23	8.03	8.88
12....	5.96	6.23	6.94	7.87	8.75	9.68
13....	6.44	6.73	7.50	8.51	9.47	10.48
14....	6.92	7.23	8.06	9.15	10.19	11.28
15....	7.40	7.73	8.62	9.79	10.91	12.08
16....	7.88	8.23	9.18	10.43	11.63	12.88
17....	8.36	8.73	9.74	11.07	12.35	13.68
18....	8.84	9.23	10.30	11.71	13.07	14.48
19....	9.32	9.73	10.86	12.35	13.79	15.28
20....	9.80	10.23	11.42	12.99	14.51	16.08
21....	10.28	10.73	11.98	13.63	15.23	16.88
22....	10.76	11.23	12.54	14.27	15.95	17.68
23....	11.24	11.73	13.10	14.91	16.67	18.48
24....	11.72	12.23	13.66	15.55	17.39	19.28
25....	12.20	12.73	14.22	16.19	18.11	20.08
26....	12.68	13.23	14.78	16.83	18.83	20.88
27....	13.16	13.73	15.34	17.47	19.55	21.68
28....	13.64	14.23	15.90	18.11	20.27	22.48
29....	14.12	14.73	16.46	18.75	20.99	23.28
30....	14.60	15.23	17.02	19.39	21.71	24.08
31....	15.08	15.73	17.58	20.03	22.43	24.88
32....	15.56	16.23	18.14	20.67	23.15	25.68
33....	16.04	16.73	18.70	21.31	23.87	26.48
34....	16.52	17.23	19.26	21.95	24.59	27.28
35....	17.00	17.73	19.82	22.59	25.31	28.08

FOURTH-CLASS
(PARCEL POST)

Weight—1 pound and not exceeding (pounds)	Zones							
	Local	1 and 2	3	4	5	6	7	8
2....	$0.60	$0.65	$0.70	$0.75	$0.80	$0.90	$1.00	$1.05
3....	.60	.75	.80	.85	.95	1.10	1.20	1.35
4....	.65	.80	.85	.95	1.10	1.30	1.40	1.60
5....	.70	.85	.90	1.05	1.20	1.45	1.65	1.90
6....	.70	.95	1.00	1.15	1.35	1.60	1.85	2 10
7....	.75	1.05	1.10	1.25	1.50	1.75	2.10	2.35
8....	.75	1.10	1.15	1.35	1.60	1.90	2.30	2.60
9....	.80	1.15	1.20	1.45	1.75	2.05	2.45	2.85
10....	.80	1.20	1.30	1.55	1.90	2.20	2.65	3.10
11....	.80	1.25	1.35	1.60	2.00	2.30	2.85	3.35
12....	.85	1.30	1.45	1.70	2.10	2.45	3.05	3.55
13....	.85	1.35	1.55	1.80	2.20	2.60	3.25	3.80
14....	.90	1.40	1.60	1.90	2.35	2.75	3.45	4.00
15....	.90	1.45	1 65	2.00	2.45	2.85	3.60	4.20
16....	.95	1.55	1.75	2.05	2.55	2.95	3.80	4.40
17....	1.00	1.60	1.80	2.15	2.65	3.10	3.95	4.60
18....	1.00	1.65	1.90	2.20	2.75	3.20	4.15	4.80
19....	1.05	1.70	2.00	2.30	2.85	3.35	4.30	5.00
20....	1.05	1.75	2.05	2.40	2.95	3.50	4.50	5.20
21....	1.10	1.85	2.10	2.45	3.05	3.65	4.65	5.40
22....	1.15	1.90	2.15	2.55	3.15	3.75	4.85	5.60
23....	1.15	1.95	2.20	2.60	3.25	3.90	5.00	5.80
24....	1.20	2.00	2.25	2.65	3.35	4.05	5.15	6.00
25....	1.20	2.05	2.30	2.75	3.45	4.15	5.35	6.20
26....	1.20	2.10	2.35	2.85	3.55	4.30	5.50	6.40
27....	1.25	2.15	2.40	2.90	3.70	4.45	5.65	6.60
28....	1.25	2.20	2.45	2.95	3.80	4.60	5.80	6.80
29....	1.30	2.25	2.50	3.05	3.90	4.70	5.95	7.00
30....	1.30	2.30	2.55	3.10	4.00	4.85	6.10	7.20
31....	1.35	2.35	2.65	3.20	4.10	5.00	6.25	7.40
32....	1.40	2.40	2.70	3.30	4.20	5.15	6.45	7.60
33....	1.40	2.45	2.75	3.35	4.30	5.25	6.60	7.80
34....	1.45	2.50	2.80	3.40	4.40	5.40	6.75	8.00
35....	1.45	2.55	2.85	3.45	4.50	5.55	6.90	8.20

SPECIAL HANDLING

THIRD- AND FOURTH-CLASS ONLY
SPECIAL HANDLING FEES

(Fees in addition to postage)

Weight	Fee
Not more than 2 pounds..............	25¢
More than 2 pounds but not more than 10 pounds........................	35¢
More than 10 pounds...............	50¢

SPECIAL DELIVERY

SPECIAL DELIVERY FEES

(Fees in addition to postage)

Class of Mail	Weight		
	Not more than 2 pounds	More than 2 pounds but not more than 10 pounds	More than 10 pounds
First class, air, and priority mail....	60¢	75¢	90¢
All other classes..	80¢	90¢	1.05¢

MONEY ORDERS

MONEY ORDER FEES

Amount of money order	Amount of fee Domestic
$0.01 to $10......................	$0.25
$10.01 to $50......................	.35
$50.01 to $100....................	.40

FIRST CLASS

Kind of Mail	Rate
All first-class mail weighing 12 ounces or less except postal and post cards.	8¢ per ounce.
Over 12 ounces	Priority mail (heavy pieces) rates apply.
Single postal cards sold by the post office.	6¢ each.
Double postal cards sold by the post office.	[illegible] (6¢ each half).
Single post cards	6¢ each.
Double post cards (reply portion of double post card does not have to bear postage when originally mailed).	12¢ (6¢ each half).
Business reply mail:	
Cards	8¢ each.
Other than cards:	
Weight not over 2 ounces	8¢ per ounce or fraction of an ounce plus 2¢ per piece.
Weight over 2 ounces	8¢ per ounce or fraction of an ounce plus 5¢ per piece.
Over 12 ounces	Priority mail (heavy pieces) rates apply plus 5¢ per piece.

SECOND CLASS

(Newspapers and periodical publications with second class mail privileges.)

Copies mailed by public.	6¢ for first 2 ounces, 1¢ each additional ounce or fraction thereof, or the fourth-class rate, whichever is lower.

THIRD CLASS

Circulars, books, catalogs and other printed matter, merchandise, seeds, cuttings, bulbs, roots, scions, and plants, weighing less than 16 ounces:

SINGLE RATE	BULK RATE
8¢ first 2 ounces, 2¢ each additional ounce or fraction.	CONSULT POSTMASTER

AIRMAIL
000000.

Weight	Kind of Mail	Rate
8 ounces or less	Air postal or post cards.	9¢ each.
	Letters and packages.	11¢ an ounce.
	See Priority Mail (Heavy Pieces) Schedule for rates on pieces weighing more than 8 ounces.	
	Business reply:	
	Air cards	11¢ each.
	Airmail other than cards:	
	Weight not over 2 ounces.	11¢ an ounce, plus 2¢ per piece.
	Weight over 2 ounces.	11¢ an ounce, plus 5¢ per piece.
	Weight over 8 ounces.	Priority mail (heavy pieces) rates apply plus 5¢ per piece.

INSURANCE

FEES (IN ADDITION TO POSTAGE)

LIABILITY	FEE
$0.01 to $15	$0.20
$15.01 to $50	.30
$50.01 to $100	.40
$100.01 to $150	.50
$150.01 to $200	.60

Liability for insured mail is limited to $200.

Restricted delivery. (Not available for mail insured for $15 or less) . . . . . 50¢

Return receipts. (Not available for mail insured for $15 or less)

COD MAIL

Consult Postmaster for fees and conditions of mailing.

CERTIFIED MAIL

Fee (in addition to postage) . . . . . 30¢
Restricted delivery . . . . . 50¢

REGISTRY

REGISTRY FEES (IN ADDITION TO POSTAGE)

Declared actual value (No limit)	Fees	Postal Liability
	If mailer does not have commercial or other insurance	
$0.00 to $100	$ .95	Without commercial, or other insurance —declared value.
$100.01 to $200	1.25	
$200.01 to $400	1.55	With commercial or other insurance —declared value or prorated.
$400.01 to $600	1.85	
$600.01 to $800	2.15	
$800.01 to $1,000.	2.45	
HIGHER VALUES	Consult Postmaster for Fees.	

Maximum postal insurance for shipments NOT commercially insured.	$10,000
Maximum postal insurance for shipments commercially insured.	$ 1,000

Restricted delivery (Additional fee) . . . . . 50¢

RETURN RECEIPTS

CERTIFIED MAIL-NUMBERED INSURED-REGISTERED

Requested at time of mailing:

Showing to whom and when delivered	15¢
Showing to whom, when, and address where delivered	35¢

Requested after mailing:

Showing to whom and when delivered	25¢

Try these problems, using the tables, and check your answers with your teacher.

16. What will the postage charge be for first class mail weighing 7 ounces? __________

17. What will the postage charge be for first class mail weighing 11 pounds 3 ounces going to zone 2? __________ (Hint: check priority mail--heavy pieces chart.)

18. A customer wishes to mail a package locally fourth class and insure it for $18. The package weighs 12 pounds. What is the total charge?

Fourth class parcel post rate (12 pounds) a.__________

Insurance charge ($18) b.__________

Total c.__________

19. Another customer wants to air mail two letters, each weighing 1 ounce, and send a package of two books weighing 15 ounces (third class). What would his total charge be?

Air mail letters a.__________

Third class books b.__________

Total c.__________

20. Dick wanted to mail a very important letter (weighing 2 ounces) by certified mail. The charge for this service is

Regular postage a.__________

Certified mail fee b.__________

Total c.__________

Dick thanked Mr. Olson, the superintendent, and Mr. Peron, the clerk, for the information he received. They said that he or anyone else can get information on the jobs of a carrier or clerk at the nearest post office and can ask to read the <ins>City Carrier's Instruction Handbook</ins> as well as other materials available.

CLUSTER TEN -- GOVERNMENT JOBS

Unit 2

Policeman

Don was getting a bit apprehensive toward the end of his last year in high school. Mixed emotions -- wanting to get out on his own yet not knowing what type of work to do -- caused his concern. So he did something he had never done before. He tried to figure out exactly what his interests were. He knew he liked to work with people, yet he didn't especially want to work in office-type surroundings.

Don started to explore various careers dealing with people. He discovered two volumes of careers and related information titled Encyclopedia of Careers in the counselors' office. One of the counselors suggested that he look under several occupations. Some job titles listed were barber, cook, FBI agent, fireman, policeman, and waiters.

The policeman's job interested Don, and he decided to contact the police department for information. He was referred to the Civil Service Department, which does the testing of applicants. Don found that the next examination wouldn't be for some time, but he could call the community relations department for information. He did this, and when he spoke with Officer Schmidt, he was given a pamphlet containing the initial requirements for a patrolman. Some of these are :

1. Age -- 20 to 30; a veteran can be 35
2. Twelfth grade education or equivalent
3. Minnesota driver's license
4. Height of 5' 8" or taller
5. Good driving record, no arrests for felonies

6. Good eyesight, hearing, and general health
7. Score of 70 percent or better on a Civil Service Examination; a good job on a physical agility test, and interview with a three-man board

The pamphlet also stated some of the patrolman's duties:

> Patrolling on foot, investigating complaints, checking property, checking suspicious persons, knowing traffic laws, helping preliminary investigation of crime, testifying in court, and other duties assigned by the chief.

Officer Schmidt said all applicants are ranked by the initial scores and are put on a list. When the need arises for patrolmen, a class is started. The class is a 16-week rookie school that includes classroom time, field trips, and on-the-job training. Some topics covered are the criminal code, physical training, community and human relations, search and seizure techniques, and traffic laws. The last few weeks the rookie spends one half time in class and one half time in a squad car.

Upon finishing the course, the patrolman is sworn in and assigned to a division. The pay ranges from $800 per month to $946 per month in five years (1971).

Don asked how long a patrolman must work before he can be promoted to a sergeant or some other category. Officer Schmidt said a patrolman must serve at least five years to be eligible for promotion. Then he must take a specific examination for the new job. Seniority and the exam results determine who gets the job.

UNIT 10-2

Part of the Civil Service Examination covers some basic math. Try the following sample problems to see how you would do on this part of the test.

1. Three man hours are required to inspect six buildings. If there is an average of five buildings per square block, how many man hours are required to inspect five square blocks?

2. A patrolman has a "beat" that covers 40 square miles. He usually drives 90 miles per day. How many miles would he drive per week? a.__________ Per year (assume two weeks vacation) b.__________

3. $485\overline{)1385.4}$

4. 2/3 of 899 = __________

5. In a city of 400,000 there are 800 police officers. What is the ratio of police to population? ___________

6. Using the figures in five, it is misleading to assume the ratio found is the true one at any one time. All 800 officers are not working an eight hour shift (three shifts per day). How many officers would be working at any one time? (round off to nearest whole number). a. ______
What is the ratio of officer to population at any one time? b. ________

7. If the ideal ratio of officers to population is 1 to 800, how many officers should be employed in the city referred to in five and six? (Remember: three shifts must be covered.) ___________

8. The borders of Officer Friday's patrol area were 28th Avenue on the east to 72nd Avenue on the west and Aldrich Street on the north to Penn Avenue on the south. (The streets were alphabetical: Aldrich, Blaisdall, Colfax, etc., to Penn.) He received a call from the dispatcher to assist at an accident scene located at 68th and Logan. He was at 33rd and Emerson. How many blocks must be traveled to get to the scene of the accident?

a._________

How many miles is this? (12 blocks = 1 mile) b.____________ If he averages 21 mph, how long will it take him to reach the scene of the accident? c.____________

9. Later that day he received a call to investigate a burglary at 54th and Oliver. He was at 29th and Girard at the time. The distance he had to travel was _________________.

Officer Schmidt concluded by saying that on the job math use is minimal, but sound logic and reasoning are a must. You may be confronted with a delicate situation that requires immediate treatment without offending anyone. Don realized that maturity in judgement and actions is a key to being a good patrolman.

CLUSTER TEN -- GOVERNMENT JOBS

Unit 3

Air Traffic Control

"When it sits on the end of its concrete perch, wings drooping, uttering a sickening whine, you can hardly help but feel sorry for it. A silvery, lifeless hulk, the sun's rays reflecting from its motionless sides, it sits there as if waiting for some supreme hand to lift -- Hey! It's on fire! Look at the smoke! Call the fire department -- It's moving! Man look at it go! The whine becomes a scream and then a deafening roar. Then it lifts its breast to the wind and - and -- It's off the ground! Climbing steeply, it curls off in a gentle arc. Soon only the black smoke and vapor trail remain. Man! What a spine-tingling sight!"

These words describe a young man's feelings as he watches a huge 747 airplane lift into the sky, bound for -- well, somewhere.

The young man is Jerry, a senior in high school. Jerry's only connection with flying is that he has an uncle who is a copilot for one of the major airlines. He has yet to take his first commercial flight, but his interests are not in flying alone. Jerry's real interests are in studying the complex problems of traffic control. This involves an expert knowledge of time tables, flight patterns, rate of climb, rate of descent, altitudes, stacking patterns, and many more very technical facts.

Jerry went to the airport one weekend and while walking around the lobby he spotted a bulletin board. On it was a notice that there were openings in air traffic control and that a training school would start on a date two weeks from then. He went directly to the personnel office and applied.

UNIT 10-3

A week later, Jerry received a letter asking him to report to training the next Monday at 8 a.m. With the job situation as it is now, Jerry felt very fortunate that he got the first job he applied for. This normally doesn't happen!

At training he was started on an intensive review of the facts he would have to be able to use. One of the first tests was on mathematics.

Try the problems on this sample test.

1. Change these times to like units and perform the indicated operations.

a. add
½ hr.
57 min.
1.1 hr.
3½ hr.

b. add
85 sec.
12½ min.
3/4 min.
1½ hr.

c. subtract
1 1/3 hr.
12 min.

d. subtract
5 hr. 10 min.
3 hr. 53 min.

e. (multiply)
2 hr. 10 min. 8 sec.
x 8

24-hour clock problems -- subtract

f.
09:56
09:48

g.
19:38
15:59

2. a. Rate of climb is 2000 ft./min.
How high will the plane be after 3 min. 1.________
after 5 min. 2.________
after 7½ min. 3.________

b. Ground speed (the speed the plane's shadow travels along the ground) is 300 mph. How far will the plane travel in 1 hr. 1.________
in 30 min. 2.________
in 10 min. 3.________
in 1 min. 4.________

c. If there are 6020 feet in a nautical mile, how much longer than a land mile is this? 1.______ How many feet are in 12 nautical miles? 2.________ in 12 land miles? 3.________

Be sure to check with your teacher before going on.

A lot of the work that Jerry was doing involved some trigonometry and higher algebra, but we'll look at some of the work that was not quite so complicated. One of the jobs he did involved knowing exactly how far away a plane is at a certain time after take off. This required knowing the ground speed and the time of flight. If a 707 had lift-off time at 09:52 (9:52 a.m.), ground speed of 200 knots (nautical miles per hour), and the time was 09:57 (9:57 a.m.), how far down range was the plane? Also, if it had been climbing at a constant rate of 2000 feet per minute, how high was it now? On this problem Jerry used a well known formula called the distance formula.

$D = rt$,
where D = distance,
r = rate of speed
and t = time of travel.

In this problem Jerry was looking for the distance. He knew r was 200 knots and t was 5 minutes (09:57 minus 09:52). So, all he had to do was put 200 in for r and 5 in for t:

$$\begin{aligned} D &= r \times t \\ &= 200 \times 5 \\ &= 1000 \end{aligned}$$

Was that possible: 1000 miles (nautical miles) in only five minutes! That's like going from Minneapolis to Detroit in five minutes. Oh, sure, a space satellite could do it, but we're talking about a 707 jet that goes about 600 miles per hour and in this problem it was going only 200 miles per hour. So, what had he done wrong? That's right! He put five minutes in the formula and what should he have done? Of course! He had to find out what part of an hour five minutes is. That would be comparing five minutes with 60 minutes or $\frac{5}{60}$ hours. This reduces down to 3.________ of an hour. Now using the formula D = r x t we have 4. D = 200 x __________

5. = _________ miles (nautical)

That answer seems more logical doesn't it?

The next thing Jerry had to do was find the altitude (the height) of the plane at 09:57 a.m. Climbing at a constant rate of 2000 feet per minute for 5 minutes (09:57 minus 09:52) means the plane was 6,______feet high after 5 minutes.

Work the following problems in the same way Jerry did (except -- be sure to change minutes to hours when using the formula D = r x t).

7. Time now: 14:45
   Flight 218 for Los Angeles
   Lift-off time 14:37
   Climbing rate 1550 feet per minute
   Climbing ground speed 250 knots

   a. What is the altitude at 14:45?___________ feet

   b. How far down range is the plane at 14:45?_______miles (nautical)

   c. Change 250 knots to land miles per hour.

   $250 \times \frac{6020}{5280}$ = _________(nearest miles per hour)

   d. Reduce $\frac{6020}{5280}$ to its simplest form________.

   e. Change $\frac{301}{264}$ to a decimal (rounded to nearest hundredth) ___________. Remember this number. It will be helpful in the following problems.

8. Time now 07:36
   Flight 15A Minneapolis to New York
   Lift-off time 07:31
   Rate of climb 1700 feet per minute
   Climbing ground speed 270 knots

   a. What is the altitude at 07:36?________feet

   b. How far down range (in land miles) is the plane at 07:36?__________(nearest tenth of a mile)

c. If it is 1028 air miles from Minneapolis to New York (an air mile is the straight line land distance) and it requires 88 land miles for climbing and landing, how long is the cruise distance (level flying distance at constant speed)?_________
If the cruise speed is 500 knots, what is the speed in miles per hour?________miles per hour
At this rate, how long will it take to fly the 940 miles at cruise speed?________hours (figure this out to the nearest hundredth hour)

9. Flight from Minneapolis to San Francisco
Air distance is 1591 air miles
Climbing rate is 2000 feet per minute
Climbing time is 12 minutes
Landing and takeoff distance is 71 miles
Cruise speed is 520 knots

a. What is the cruise altitude?_________feet

b. What is the cruise distance?_________land miles

c. What is the cruise speed in miles per hour?_________

d. What is the cruise time?__________hours (nearest hundredth)

After investigating the problems he actually would be solving, Jerry was very glad he had spent the time he had in math class. The above sample problems are just a small part of the actual job Jerry had to do. His major concern was communication and direction of incoming and outgoing air traffic and controlling stacking patterns.

Jerry, however, wasn't doing much of the actual control yet. He was assisting controllers who had taken up to three to four years to actually become a controller. There would be other tests and much on-the-job learning under the supervision of a full controller before Jerry could work as a controller.

Jerry liked the excitement of the job and enjoyed watching the controllers work -- especially when they were busy. He learned quickly not to disturb them because they were keeping the positions of many planes in their minds and one mistake could, of course, be very serious.

The pressure that these men worked under was the biggest drawback for this kind of work.

Jerry did discover that these controllers can make very good money -- even up to $20,000 a year for the top men at large control centers. This was quite a bit better than the $480 a month that he started at.

Earnings, working conditions, excitement -- these convinced Jerry that he was in a line of work that looked good for years to come.

CLUSTER TEN -- GOVERNMENT JOBS

Unit 4

Recreation and Park

Don always had loved to work outdoors. He had been active in all kinds of athletics and felt he was quite good. He even liked to play with younger neighborhood kids and sometimes found himself refereeing their games.

It looked to Don as though more time could be spent by adults for fun and leisure, too. The question was, who is going to organize the activities for recreation and more effective use of leisure time. Don's dad told him that most communities have a park and recreation department which does just that. Depending upon the size of the town, Don found out that these departments run from a one-man operation to some with budgets of 60 and 70 thousand dollars. Don lived in a town with a good-sized park and recreation department, and he decided to look into it further.

Shoreview, Don's hometown, had a director for parks and recreation who supervised and made plans for all the activities. He also was the man responsible for preparing the budget of the expenses needed to run this department. This man had a college degree in recreation. The activities this man supervised ranged from "tot" programs for preschoolers to programs for senior citizens. Don discovered that the softball league he watched was formed under this department. In Shoreview, this department was broken down into other areas: swimming pool, park maintenance, crafts, league athletics, etc. Each of these areas had a full staff of people, some of whom were high school students just like Don.

Don asked about work but was told that the extra summer employees had already been hired. He did decide to apply for work the following summer because the work looked like fun and all the people he talked to seemed to be enjoying what they were doing.

Don was able to pick up a proposed budget and had some fun filling in the blanks that were not completed yet.

(As you fill out the budget, notice the various programs the department offers and see if you feel this town is providing an adequate program for its people.)

UNIT 10-4

Shoreview Park and Recreation Department
Proposed 1971 Budget
Work Sheet

Recreation

Salaries Director's Portion	$ 4,500.00
Supervisor of Recreation Part-time	4,500.00
Full-time Secretary	6,180.00
Playground Leaders 13 leaders @ $500 each; 5 playgrounds	1. ________
Baseball Supervisor -- T-ball, Bantam, Midgets (Softball April-Aug.)	1,000.00
T-ball Coaches -- 4 coaches @$375	2. ________
Drama Instruction Teach Children's Theater	510.00
Tennis Instruction	510.00
Arts and Crafts Instruction	510.00
Warming House Attendants $2.00/hr. -- 5 men; Dec. 14-March 1; 480 hrs. per man =	3. ________
Total Recreational Salaries	4. ________

Professional Services
Specialists in Various Programs

Basketball Instructors Instructors - $3.00/hr.; 8 Dec. 6-March 22	575.00
Christmas Vacation - 1 instructor $3.00/hr.; 40 hrs. 10 a.m. to 12 noon 1 p.m. to 3 p.m.	5. ________

Football Instructors 8 weeks; 8 hrs./wk. (10) $125 each -- 5 Coaches $ 50 each -- 5 Help	6. ____________
Hockey Coaches 10 weeks; 9 hrs./wk. $100 each -- 12 coaches	7. ____________
Referees -- Hockey 60 games; $2.50/game	8. ____________
Ballet Instruction $3.75/hr. -- 100 hrs.	9. ____________
Figure Skating Instruction (2) Adults, Children	300.00
Slim-Trim Instructor $5/hr.; 30 wks. -- 2 instructors (1 hr./wk./instructor)	10. ____________
Children's Theater Instructor $4/hr.; 25 wks.; 2 hrs./wk.	11. ____________
Tap Dancing Instructor $3.50/hr.; 30 wks.; 2 hrs./wk. (rounded off to nearest hundredths)	200.00
Baton Instructor $3.50/hr.; 30 wks.; 2 hrs./wk. (rounded off)	200.00
Jogging $5/wk.; 30 wks.; 4 hrs./wk.	12. ____________
Volleyball and Basketball Instructors (2) $3/session; 30 sessions	150.00
Wrestling Instructors (Extended Program) 30 $3/hr.; 15 wks.; 5 hrs./wk.	1,050.00
Total Professional Salaries	13. ____________
Postage	230.00
Printing	900.00
Telephone	600.00
Car Expense	200.00

UNIT 10-4

Convention Expense		250.00
Bus Expense		500.00
Office Supplies		400.00
General Supplies		2,500.00
Rents		1,000.00
Fourth of July		200.00
Miscellaneous		100.00
Capital Outlay		660.00
Total Expenses	14.	
Total Recreation Budget	15.	

Parks

Salaries Park and recreation director (portion)		4,500.00
Park Foreman $837 per month -- 12 months	16.	
Park Maintenance Man #1 $683 per month -- 12 months	17.	
Park Maintenance Man #2 $673 per month -- 12 months	18.	
Portion of City Handy-Man		2,500.00
Cardener 4 months		425.00
Total Park Salaries	19.	
Utilities		3,000.00
Equipment and Vehicle Repair		650.00
Building Repair		800.00
Ground Maintenance		2,400.00
Tools and Equipment		100.00

Motor Fuels	400.00
General Supplies	1,800.00
Miscellaneous	500.00

Miscellaneous Total 20. ________

Capital Outlay
Halifax Park $5,000
Shoreline Park $1,500
Paved Service Road $1,200

Twin Lake Park $1,000
Typewriter $440
Culvert Extension $4,000
Parkland Development $500

Capital Outlay Total 21. ________

Grand Park Total 22. ________

Dutch Elm Disease Control

13 - Professional Services	
20 - Postage	
21 - Printing	20.00
23 - Botanical Supplies	
26 - Ground Maintenance (stump removal)	400.00
31 - Tools and Equipment	
33 - Motor Fuels	
39 - General Supplies	
40 - Equipment Rental	
49 - Tree Trimming and Removal	6,000.00
50 - Spray (drugs, chemicals, and gases)	7,520.00

Total 23. ________

Band Fund

10 - Salaries	5,400.00
20 - Postage	10.00
21 - Printing	100.00
22 - Telephone	50.00
24 - Repair and Maintenance	200.00
32 - Music	500.00
39 - General Supplies	200.00
40 - Rent	300.00
41 - Insurance	500.00
49 - Miscellaneous	400.00
50 - Capital Outlay	500.00

Total 24.__________

Park and Rec. Total 25.__________
(Rec. Total, Park
Salaries, Misc. Total,
and Capital Outlay)

Park, Rec., Dutch Elm,
and Band Fund Total 26.__________

Don concluded that this town seemed to provide adequately for its parks and recreational facilities. He thought that working with the various groups would be a great career and hoped his request for summer work would go through.

CLUSTER TEN -- GOVERNMENT JOBS

Unit 5

Forestry Technician

"What I want is freedom -- the woods, trails, camping, hunting, clean air, fishing -- anything outside."

This, in a capsule, is what Forrest wanted as a vocation. (For obvious reasons, all his friends called him Smokie.) His father had been a farmer before moving to the city for a better paying job and Smokie spent many hours listening to his dad talk about the country life.

"That sounds great, compared to town life! Why did you really move off the land, Dad?"

"Mom and I wanted a new start, I guess. We're sorry now, but that's behind us. Remember last summer when we were camping at Norway Beach and we heard the ranger talk about the things he does?"

"He was smooth! I'll bet he really got his kicks flying that copter all the time! I might like to look into a job like that. Have the land, freedom, the whole bit, and decent pay, too!"

"I've got the card we got at the talk he gave in my wallet. Maybe he'll send you some information."

Smokie carefully investigated a forestry technician's job and decided to try it. He would need at least a six-month course at the University Extension campus at Grand Rapids, or even up to two years at some schools. He really didn't care for the idea of more school, but the forest service job really was attractive and -- well, he'd give it a try.

"You mean I've got to take all that math and science?" he asked the counselor.

"Most of the computation is done for you in charts, but it's important that you know how everything is figured out. That's why you take the math. As far as science is concerned, you use it all the time in spraying insects and undergrowth. It's probably the single most important subject you'll study."

Smokie was surprised about the course work and really got involved in the work when he went out "in the field" for practical training. His first job was to mark timber for selective cutting. This is done just as a gardener would thin a row of carrots and the result is similar; i.e., the remaining timber grows better and faster. In this job, he measured the trees and actually computed the basal area (the area of a cross section of the tree at a point four feet above the ground).

Using the following formula, find the basal of the indicated trees:

$A = \pi r^2$

(area = 3.14 times the radius and times the radius again)

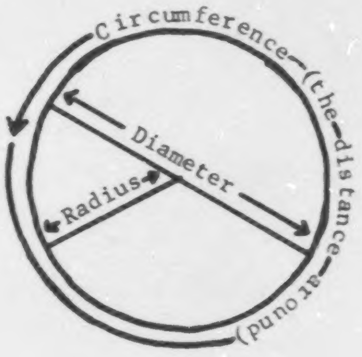
1. A pine tree with a 14-inch diameter (Remember the diameter is twice the radius.)

radius = a. __________

$A = \pi \times r \times r$

$= 3.14 \times 7 \times 7$

= b. __________ square inches



There are 144 square inches in a square foot. Divide the answer you got for the tree by 144 to change the answer to square feet.

$$144 \overline{)\text{c.}} \quad \overset{\text{d.}\_\_\_\_\_\_\_\_}{} \text{ square feet}$$

2. A poplar tree 19 inches in diameter

A (in square inches) = a.__________

A (in square feet) = b.__________

3. An oak tree 43 inches in circumference

C = π D (formula for circumference)

43" = 3.14 x D (D = diameter)

D = 43 ÷ 3.14 = $3.14 \overline{)43}$ a.__________

r = 1/2 D = b.__________

A (in square inches) = c.__________

A (in square feet) = d.__________

The recommended basal area for a well-gardened forest is 90 basal feet per acre. This means that a forest should be thinned or let grow, whichever would achieve the desired basal area.

UNIT 10-5

These are the sizes of the trees Smokie and his classmates measured in one test acre.

4. D = 10" (2 trees) Area = ________
5. D = 15" (3 trees) Area = ________
6. D = 6" (4 trees) Area = ________
7. D = 23" (2 trees) Area = ________
8. D = 4" (8 trees) Area = ________
9. D = 9" (7 trees) Area = ________
10. D = 17" (5 trees) Area = ________
11. D = 11" (10 trees) Area = ________

12. Total area = ________

What would you do to achieve the area recommended? 13.________

Mature trees are ones that are ready to be cut because they are useless when too old. Large trees are taken out to leave room for the smaller trees to grow, but many times some small trees must be cut to thin out the stand. As is easily understood, marking trees for cutting is a selective process.

Smokie studied many other subjects. One involved spraying herbicides to cause undergrowth to grow faster than the root system could handle. This resulted in the brush drying up. To do it, he had to fly a helicopter and spray the forest in narrow strips.

Being outside was the most attractive of all the benefits Smokie enjoyed.

"Working with nature. Great!"

CLUSTER ELEVEN -- UTILITIES

Unit 1

Lineman

While writing a report on public utilities for social studies class, Walt noticed that linemen did much work in both the telephone and the electric companies. He wondered what these men did and if there was any difference between them. He asked his teacher and was referred to the Occupational Outlook Handbook, where he discovered that they were listed separately and described differently, too. Walt's friend's dad worked for the telephone company, at least he drove a Northwestern Bell truck sometimes, so Walt decided to inquire further.

He found that a telephone lineman belongs to a union called the Communication Workers of America and that starting pay is $109 a week with a maximum of $172.50 after six years. To become a lineman, Walt was told that an application could be completed and the pre-employment test could be taken at the telephone office. If accepted, a person would be enrolled in a two to three week course. This course would consist of safety, climbing poles, working aloft, driving safely, the Bell system practices and organization, and information about company benefits. From then on the training is on-the-job.

Many linemen will move on to become cable splicers and earn $5 to $10 more each week. To become a splicer requires extra schooling, which requires some math. Walt's friend's dad gave Walt some examples:

1. 27 3/8 + 13 1/2 + 48 3/4 = __________

2. 147 2/3 - 48 = __________

3. 2/5 of 45 = ____________

4. 14 3/8 - 5¼ = ____________

5. For each 75 feet of telephone cable hung on poles, 2½ extra feet of cable must be added to allow for expansion and contraction caused by heat and cold. What is the total amount of cable needed for a 200-yard stretch?

____

6. In addition, the 2½ feet of excess for every 75 feet of cable allowed for contraction and expansion, a lineman must figure in two feet of extra cable (one foot on each end to be joined) wherever a splice (joining of ends) will occur. What length cable would a lineman order for a 150-yard stretch of cable that would require seven splices? (Don't forget excess for expansion-contraction.) ____________

7. Assuming the base pay of a lineman is $109 and there are nine steps to reach the maximum of $172.50 how much of a raise would each of the nine steps have if they are all equal?____________

Walt still didn't know much about the electrical lineman, and to satisfy his curiosity, he called Northern States Power Company. He found out that these linemen belong to the International Brotherhood of Electricians and earn from $4.36 to $5.78 per hour. Walt was told that he could apply for a job at the office and then take the General Aptitude Test Battery (GTB) given by the Minnesota State Testing Service. If he met the requirements, Walt could then be hired as a groundsman and work as a helper or assistant to the lineman.

In time, as there is a need for a lineman (the Twin Cities area needs 10-14 each year) a call is put out. Those with most seniority are placed in the apprenticeship program, spend about four years (7,500 hours) of on-the-job training, and attend a vocational school in the evening. The topics covered in evening school range from basic electricity to magnetism, alternating current, and high voltage. Math skills, Walt was told, can be quite important and some examples of problems generally encountered follow.

8. If $W = I \times T$ and $I = 10$, $T = 3.2$, then $W =$ __________

9. $498 + 37.45 + 14\frac{1}{2} =$ __________

10. If $L = \frac{1}{2} P + T$ and $P = 48$, $T = 4.5$, then $L =$ ____________

11. 30 yd. of wire at 3¢ a foot = ________________

If you were to check the electric wires on a pole, you would see one wire higher than the rest. This is the primary wire, carrying as much as 13,800 volts. The voltage from this wire is reduced to normal house current (120 volts) by means of a transformer. (See the Unit 3-2, "Electrician," for more information on watts, volts, and amperes.) A transformer that reduces voltage is called a step-down transformer. What is the percentage of reduction from the primary wire to the secondary wire (the one carrying normal house current)? In other words, what is the percent of reduction from 13,800 to 120? 12. ______

13. A five percent addition to the length of a wire is added for slack. What length wire must be ordered by a lineman for a distance of 220 yd.?__________

14. 1/60 of a length of wire may be wasted due to cutting, etc. What part of a 375-foot wire would be lost by this amount of waste (round off to tenths)?

____

15. Sections of wire, each of which must have a five percent addition for slack, are 50 ft., 75 ft., 100 yd., and 20 yd. What is the total amount of wire a lineman would order if he were to install all these sections?______

Jack, a lineman for 10 years, is at the top of the scale ($231.20 per week). Usually 27 percent of his gross (total) salary is taken out for taxes, benefits, and savings bonds. What would his take home pay be per week?

16. ______________

What is Jack's per year gross earning? 17. ___________

What would his per year net (after deductions) earnings be? 18. ___________

Benefits which Walt noticed that linemen have include working outside, some travel, and being able to work constructively with their hands as well as requiring substantial mental ability. Public utilities for a career had not been of much interest to him prior to his investigation of the responsibilities involved.

"Public utilities are important to all of us," was Walt's closing comment. And the social studies teacher thanked Walt for a job well done.

CLUSTER ELEVEN -- UTILITIES

Unit 2

Telephone Repairman

Probably no single invention other than the wheel has affected family life more than the telephone. Most homes have at least one phone and 50 percent have two. In residential areas three or more phones are in 15 to 20 percent of the dwellings.

Why are they so popular? These questions seem to hound each of us. To answer them would be an endless task. Probably the best answer was given to Ripp Eyamen by his electronics teacher. He said, "People have all those phones just for convenience, I guess." This seemed simplified, but thinking about it will convince you that "convenience" is probably the best answer.

Ripp became quite interested in how a phone works and what was involved in the hook-up, so he decided to talk to his neighbor Dave, a telephone repairman, about his job.

"There's no extra school like junior college you'll have to attend. The phone company provides all the training you need. Sure, any training in electronics will help, but to be a repairman, you really don't need a lot," Dave explained.

Dave told Ripp that some simple math was needed. He wrote out a few problems as examples.

Addition

1.		2.		3.		4.	
	15		$39.68		48		29
	7		50.84		57		44
	10		43.40		46		13
	18		39.68		60		6
	7		54.56		56		16
							82
							53
							112
							87

UNIT 11-2

Multiplication

5. $\frac{1}{7} \times 62 =$ ______

6. $\frac{5}{7} \times 8 =$ ______

7. $$\begin{array}{r} \$4.96 \\ \underline{\times\ 8} \end{array}$$

8. $$\begin{array}{r} \$4.96 \\ \underline{\times\ 1.5} \end{array}$$

9. $$\begin{array}{r} \$4.96 \\ \underline{\times\ 2} \end{array}$$

Percents

10. $$\begin{array}{r} \$25.73 \\ \underline{\times\ .25} \end{array}$$

11. 33% of 96 = __________

12. 47% of 122 = __________

13. 25% of __________ is 100

Check with your teacher before continuing.

UNIT 11-2

Ripp still didn't know if he wanted to be a repairman. He obtained permission to ride with Dave and see exactly what was included in a day's work.

All the work Dave did was scheduled in units of time. A single unit is 1/7 of an hour. That would be 14.__________ units per hour or 15.__________ units per eight-hour day. Each job, such as reconnects, reinstalls, and regrades, receive different units of time. The following is part of the schedule.

Reconnect (phones left in home)

6 units for first phone = 16.__________ hours

3 units for each additional phone = 17.__________ hours

9 units for each new phone added = 18.__________ hours

Connect (new structure)

7 units for lead in wire = 19.__________ hours

10 units for first phone = 20.__________ hours

9 units for each additional phone = 21.__________ hours

Reinstall (original phones had been removed and new sets were to be put in same location)

8 units for first phone = 22.__________ hours

6 units for each additional set = 23.__________ hours

5 units for installing bell chimes or exterior ringer = 24.__________ hours

How many units are charged for installing three phones in a brand new home with an exterior ringer? 25.__________

This equals 26.__________ hours.

On a reconnect job, two phones were to be connected at old terminals and a third phone was added. This is 27.__________ units or 28.__________ hours.

In a home where the old sets had been removed, four new phones were to be installed. Also add four units for regrading the line from two-party to private. The job would be charged 29.__________ units or 30.__________ hours.

Ripp found out that current wages were $4.96 per hour for the first 40 hours per week. Then for the next 9 hours (up to and including 49 hours) the wages were time-and-one-half or 31.__________ per hour. For every hour over 49 hours per week, he would receive double-time or 32.__________ per hour.

Find the weekly wages for the following men:

44 hours = 33.__________ for regular time
plus 34.__________ for over-time
or 35.__________ for the week.

52 hours = 36.__________ for regular time
plus 37.__________ for over-time
plus 38.__________ for double-time
39.__________ for the week.

By going to night school, Ripp could get extra training in electronics which would give him a chance for better advancement. This proves to be quite an incentive for a lot of men who work for the phone company.

After Dave had explained these things, Ripp decided to apply for a job as a repairman. It seemed to be an exciting job.

CLUSTER TWELVE -- MANUFACTURING AND SUPPLY

Unit 1

Warehouse and Stocking

Stu King watched as three large semi-trailer trucks, heavily loaded with plywood and paneling, drove out of the Florida-Pacific warehouse. No sooner had they entered Industrial Parkway than they were signaled to drive onto a portable state highway scale.

"Oh boy, this'll be fun. Those guys will pay through the nose for being overweight."

Stu walked to where the trucks were stopped and watched as the truck drivers drove first the tractor's front wheels, then the tandem drivers, and finally the trailer tandems onto the scale. The front axle weight of the first truck was 9,210 pounds, tandem driver weight was 31,950 pounds, and trailer tandem weight was 31,720. Stu asked the state patrolman what the maximum legal weight of a semi truck was. He was told that if the distance between the front tandem of the tractor and the rear tandem of the trailer was at least 32', and the tandem axles were at least 4' apart, the maximum weight of the truck could be as much as 73,280 pounds.

Adding the three weights together, Stu found the total weight to be 1.________.

"There's a lot that has to be taken into consideration when you load a truck for maximum load isn't there?" Stu asked the driver.

"That's where the warehouse foreman and crew come in the picture," the driver told him.

Stu watched the second and third trucks being weighed; both weighed much the same as the first. He walked back to the warehouse to see if he could talk to the manager or foreman about a job. Until this time, he didn't think there was much more than driving a fork lift involved in working in a plywood warehouse.

The pre-employment interview was short, and for a good reason. They needed help that day. However, before Stu started work, he found out that he would have to join the union after 30 days and at that time his salary would go up to union scale. Along with receiving this information, Stu had to take a short test like the one that follows. Try this test before going on in this unit.

2. Addition

a. 9,632
18,026
17,082

b. 17,812
31,962
10,814

c. 96
23
49
30
36
58
71
107

3. Subtraction

a. 73,280
- 46,000

b. 74,750
- 73,280

c. 32,000
- 29,867

4. Multiplication

a. 120
x 96

b. 80
x 36

c. 107
x 17

5. Division

a. $32\overline{)25}$ b. $28\overline{)22}$ c. $1000\overline{)1800}$

Check with your teacher before going on.

Stu was surprised by the amount of material handled in the warehouse. He had an order for 1000 board feet of 1" x 8" redwood lumber. He remembered that a board foot is one foot wide, one foot long, and one inch thick. How would it work when the boards are only 8" (two thirds of a foot) wide?

"All you do is find the total length of the boards and multiply the answer by two thirds since eight inches is two thirds of a foot."

What do you think you would multiply by if you had six inch boards? 6.________

Four inch boards? 7. ________

Stu loaded 20 16-foot boards, 20 14-foot boards, 25 12-foot boards, 44 10-foot boards, and 20 eight foot boards on the fork lift. How many board feet did he load?

8. 20 x 16' = __________'

9. 20 x 14' = __________'

10. 25 x 12' = __________'

11. 44 x 10' = __________'

12. 20 x 8' = __________'

13. Total __________' x 2/3 = _________ board feet

Stu had to band the redwood lumber and ship it to the customer by common carrier (a trucking concern that specializes in less-than-truck-load or L.T.L. orders). This involved filling out a bill of lading (shipping invoice) and knowing the weight of the lumber. He checked a chart and found out that the lumber he was shipping weighed 1.8 pounds per board foot. How much did the lumber weigh? 14.__________

From a warehouse of this type most of the L.T.L. orders are shipped freight collect so Stu didn't have to figure out the freight charges for the redwood lumber.

As soon as the redwood was ready to ship, the foreman approached Stu.

"See if you can figure out how to load these orders for tomorrow morning."
"Do they go on the long or short flatbed?" Stu asked.
"Figure out the weight and see which one it'll fit on."

The following are the orders:

480 (4 units) 4 x 8 ¼" AD plywood
400 (4 units) 4 x 8 5/16" CD sheathing
120 (2 units) 4 x 8 ½" AC plywood
120 (2 units) 4 x 8 ½" AD plywood
400 (8 units) 4 x 8 5/8" CD sheathing

If the tractor and trailer weigh 27,280 pounds, what is the maximum load that can be hauled?

73,280 - 27,280 = 15.__________

Will it be possible to haul all the orders that the foreman gave Stu on one load? Use the following chart to figure out the total weight of the orders.

Dimension	Weight per Piece	Pieces per Unit	Weight per Unit
4' x 8' x 1/4"	23 lbs.	120	16.
4' x 8' x 5/16"	30 lbs.	100	17.
4' x 8' x 3/8"	36 lbs.	80	18.
4' x 8' x 1/2"	49 lbs.	60	19.
4' x 8' x 5/8"	58 lbs.	50	20.
4' x 8' x 3/4"	71 lbs.	40	21.
4' x 8' x 1"	96 lbs.	30	22.

Using the above weights, find the weight per unit. Using the above weights per unit, find the total weight of the orders (given on page 4) that Stu has to load.

23.__________

Is it possible to legally haul all the material? 24.__________ If overweight, by how much? 25.__________

Noticing that all the 5/16" were on one order close enough to be hauled on a small truck, Stu decided to take them off the order. Will this be enough to make the load legal weight? 26.__________ Would it be wise to take out a load with the weight so close to the limit? 27.__________

There are tables of weights that Stu had to use. Each product has a different unit weight depending on the type of material. Sometimes Stu was interested in finding the weight of a 4' x 7' or 4' x 6' or 3' x 8' piece of material. All the charts gave was the 4' x 8' weight, so he had to convert it to whatever he wanted.

A 4' x 8' x ¼" prefinished panel weighs 25 pounds. Find the weight of a
4' x 7' x ¼" panel 28.__________ ; a 4' x 6' x ¼" panel 29.__________ ; a
3' x 8' x ¼" panel 30.__________.

Stu's job seldom was boring. He was always doing something new. The job had good security and provided benefits such as insurance and retirement. Jobs like this are hard to find.

He also found that the $2.10 an hour he was earning was as good as the pay received by most of his friends, many who'd been working for some time longer than he.

CLUSTER TWELVE -- MANUFACTURING AND SUPPLY

Unit 2

Inventory Control

"Inventory control! What's that?"

That was Eva's first reaction when the lady in the employment office showed her the job listing.

"It involves keeping track of the stock on hand, orders out and received, and the movement of stock," was the answer.

"That would take a lot of skill with numbers, wouldn't it? Boy, I wonder if I could handle it."

"There's an easy way to find out. The company sent this screening test with the job listing. Try it and see."

Eva went into a small room by herself and took the test. It was like the one below. See how well you can do on it.

Addition and subtraction skills are extremely important. Do these by sight.

1. 175 + 15 = __________
2. 2,586 - 1,800 = __________
3. 96 + 35 = __________
4. 432 - 120 = __________
5. 190 - 17 = __________
6. 4,386 - 120 = __________
7. 131 - 15 = __________
8. 312 + 240 = __________

Column addition and successive subtraction is needed to find monthly and yearly consumption of a certain product.

9.
343
192
185
243
1412
1822
2186
1642
1922
1875
1186
725

10.
143 - 18 = a._____
87 - 28 = b._____
93 - 40 = c._____
156 - 131 = d._____
Total = e._____

11.
76
92
18
104
73
17
872
48
196
12
543
172

UNIT 12-2

Multiplication by conversion factors is necessary to change number of pieces to surface footage.

12. 120 pieces 4' x 8' plywood
x 32 conversion factor: 4 x 8 = 32

_________ square feet

13. 73 pieces 4' x 10' plywood
x __ conversion factor

_________ square feet

14. 17 pieces 5' x 9' plywood
x __ conversion factor

_________ square feet

15. 80 pieces 4' x 12' plywood
x __ conversion factor

_________ square feet

Change these numbers to units of one thousand; i.e., 1,932 = 1.932 thousands

16. 2,000 = _________ thousands

17. 51,592 = _________ thousands

18. 867 = _________ thousands

19. 10 = _________ thousands

Be sure to see your teacher before going on in this unit.

When the test was checked, Eva's score was very good, so the agent called the company and arranged for an interview. Eva went right to the office, a building materials distributor, saw what was involved, discussed working conditions with the manager, and was asked to start the next day. The starting salary wasn't too good, but she had good chances for advancement.

Her first duty was to extend (calculate) the invoices for the material shipped the day before.

20. Finish extending the following invoice:

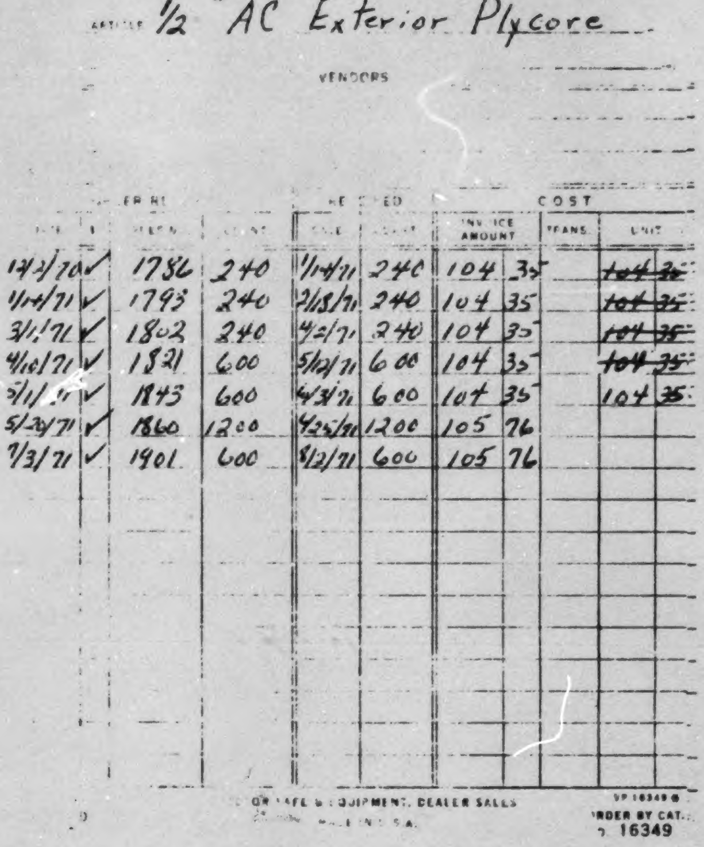
Number pieces	Dimension	Description	Conversion factor	Per 1000 footage	Cost per 1000	Price
120	4'x8'	½" AC exterior plycore	32	3,840	120.00	460.80
80	4'x8'	5/8" CD sheathing			125.00	
17	4'x8'	¼" Prefinished v-grooved oak			300.00	
26	4'x12'	½" Sheetrock			50.00	
20	48"x96"	3/8" Sheetrock			45.00	
					Total invoice amount	

This invoice could be one for the purchase of a large lumber yard. Complete it by following the example given on the first line. Notice that the conversion factor, 32 for the first line, is simply found by multiplying the length times the width, which is shown for you as the dimension of the material. Remember, the dimensions must be in feet. You would not use 36" (" means inches); change it to 3' (' means feet). Of course, this simply involves dividing the number of inches by 12 to change the dimension to feet.

After finding the conversion factors, multiply it by the number of pieces to get the number of square feet. In this problem it is: 32 x 120 = 3,840 or 3.840 per 1000 footage. When you have the per 1000 footage, i.e., 3.840, multiply it times the cost per 1000 feet and this gives the invoice amount for that line. Then add these prices to get the total invoice amount.

The next responsibility Eva had was to keep the Kardex file up to date. She had to be sure this ordering record was up to date.

The card on the right is just part of the ordering record. Notice the date of the order and the check indicating that an acknowledgement has been received from the factory verifying the order. Then the order number and the number of pieces ordered are listed.



1/2 "AC Exterior Plycore

VENDORS

[illegible]				[illegible]		COST				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	INVOICE AMOUNT		TRANS.	UNIT	
12/2/70	✓	1786	240	1/14/71	240	104	35		~~104~~	~~35~~
1/14/71	✓	1793	240	2/18/71	240	104	35		~~104~~	~~35~~
3/1/71	✓	1802	240	4/2/71	240	104	35		~~104~~	~~35~~
4/10/71	✓	1821	600	5/12/71	600	104	35		~~104~~	~~35~~
5/1/71	✓	1843	600	6/3/71	600	104	35		104	35
5/20/71	✓	1860	1200	6/25/71	1200	105	76			
7/3/71	✓	1901	600	8/2/71	600	105	76			

EQUIPMENT, DEALER SALES

RDER BY CAT.
16349

21. Why do you think it is necessary to keep a record like this?

____

____

____

When the merchandise is received, the date and the quantity are recorded along with the per 1000-foot cost of the material. This was a very important figure because the profit earned by the company was based on it.

In order to figure out the exact unit cost after receiving the 1,200 pieces on 6/25/71, Eva had to know how many pieces were still in stock at the old price of $104.35. To find this out, Eva had to complete the following inventory card.

So that you can figure out the new unit cost of 6/25/71, fill in the balance-on-hand column. Eva filled in some blanks to help you as check points.

22.

DD 129 DISBURSEMENTS & RECEIPTS

'71	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND	DATE	ORDER OR REQ. NO	QUANTITY IN	QUANTITY OUT	BALANCE ON HAND
1-7	21826		120	286	6-4	22917		120											
1-10	21913		60		6-7	23007		120											
1-14	1756	240		466	6-21	23041		240											
1-20	21971		20		6-24	23103		232											
1-22	21981		80		6-25	1860	1200												
2-7	21999		61		7-4	24001		240											
2-14	22017		120		7-10	24111		480											
2-24	22111		20		7-12	24141		17											
3-4	22146		10		7-19	24161		69											
3-11	22152		60		7-22	24257		144											
3-19	22163		13		7-23	24264		23											
4-2	1802	240		322	7-23	24265		120											
4-6	22418		80		7-25	24280		120											
4-15	22500		70		8-2	1901	600		641										
4-25	22610		120																
2	1821	600		652															
-12	22718		240																
5-13	22719		240																
5-24	22811		16																
6-3	1843	600		756															

DESCRIPTION	MINIMUM			
	MAXIMUM			

SHORT NUMBER	ARTICLE	ORDERED	SHIPPED		SECTION	AISLE	LONG BIN
	4'x8'x½" AC Exterior Plycore						

There were 23.______ pieces left at the old price of $104.35, and the new combined cost can be found by doing the following computation:

$$\frac{\text{sq. footage of old stock} \times \$104.35 \text{ per } 1000 + \text{sq. footage} \times \$105.76 \text{ per } 1000}{\text{Total square footage (both old and new)}}$$

This appears to be a very complicated computation, but not really. Let's take a close look at an example for you to follow.

Example:

10 pieces of 4x8¼" AD in stock, cost $50

100 pieces of 4x8¼" AD new stock, cost $55

Conversion factor is 4 x 8 = 32

Square footage, old stock: 10 x 32 = 320

Square footage, new stock: 100 x 32 = 3200

$$\frac{\overbrace{320 \times \$50}^{a} + \overbrace{3200 \times \$55}^{b}}{\underbrace{320 + 3200}_{c}}$$

a. 320 x $50 per 1000 = $16

b. 3200 x $55 per 1000 = $176

c. 320 + 3200 = 3520

$$\frac{a.\ \$16 + b.\ \$176}{c.\ 3{,}520} = \frac{\$192}{3{,}520}$$

Now divide c into (a + b).

$$c.\ 24.\_\_\_\_ \overset{\$54.55 \text{ (rounded to nearest cent)}}{\overline{)25.\_\_\_\_}} (a + b)$$

The answer (in dollars and cents) is the new cost of the stock.

26. Now following the example, find the new cost for the total material in stock after receiving the 1,200 pieces on 6/25/71. Record this on the order card. There was another shipment received on 8/2/71. Calculate the new cost for this date, also, and record it on the order card on p.4.

Eva's job had quite a bit of computation involved. However, there were some very simple jobs, too.

27. Consider the card on the right. It is a consumption record. Add the number of pieces sold, as recorded on the inventory card, for February, March, April, May, June, and July and record them in the 1971 column.

Eva had to make judgments based on this card. How many pieces should be ordered for the month of September? 28.______

½" AC Exterior Plycore

1
2
3
4

	1969	1970	1971	19	19	19	19
JAN	198	210	280				
FEB	167	175					
MAR	99	120					
APR	205	312					
MAY	776	800					
JUNE	653	560					
JULY	1422	1181					
AUG	546	570					
SEPT	781	910					
OCT	310	245					
NOV	480	520					
DEC	114	150					
TOTAL							

MEMO:

CAT. NO. 1-5218 PRINTED IN U. S. A.

Were there enough pieces in stock on 8/2/71 for the month of August? 29.______

30. Add the monthly consumptions for 1969 and record this annual consumption on the card. Do the same for 1970.

With the many other responsibilities she had, it took Eva a few months to become completely familiar with her job. However, it was a job that commanded respect, and after she had been at it awhile, her salary increased, too.

CLUSTER THIRTEEN -- PRINTING AND PUBLISHING

Unit 1

Printing

Bruce was on the staff of the school newspaper. He wrote the sports page and often delivered the copy to the printer. One day he decided to look around at the printer's establishment to see how the newspaper really got printed.

He was surprised to find out how many different jobs there were. He met a composition man who "set type " a pressman who operated the printing press, a bindery man who put the pages of books together, and a proofreader who checked the printed material for mistakes.

While walking through the front office, Bruce saw an old friend who was applying for a job there. At that point, he was looking over a test that he had just taken. Bruce sat down and looked at it, too.

1. A pressman has a run of 32,000 impressions to print. If on the first day he prints 10,789 and on the second day, 11,255, how many more impressions remain to be printed to complete the job?____________

2. How many sheets of 22" x 34" stock will be needed for 1400 letterheads if eight can be obtained from a sheet?____________

3. A folding job was done by five girls. What was the average number folded by each girl if the number of copies folded was 42,250?____________

4. A copy of a form which calls for 7 ruled columns is received from a customer. If these columns are to be ½", 3¼", 2 3/4", 5½", 1/8", and 1 1/8" respectively, what is the width of all of the columns? __________

5. 12½ hours was required for composition on a job, 7 3/4 for press-work, and 4½ hours in the bindery. How many hours were required to complete the job?____

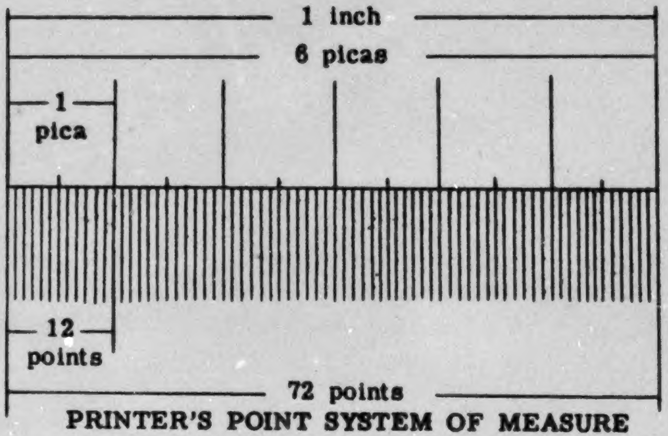
6. The last day of school, a student found he completed 1,062 hours of school time. If 175 3/4 hours were in math, 201 in english, 95½ in music, 70 in athletics and 160¼ in social studies, the rest of the time was shop time. How many hours of shop time did he serve?_____________

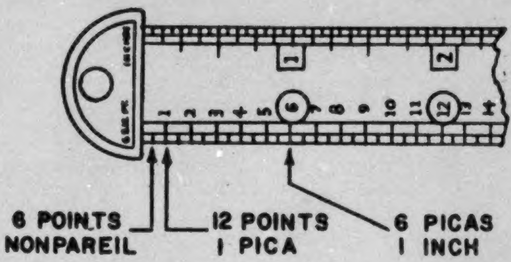
7. If a pressman feeds 6,000 impressions which is 3/8 of a run, what is the total run for the job?_______________

8. A pressman ran off 24,400 sheets in 13½ hours. What was the average output per hour?_____________ 9. $\frac{x}{25} = 10$, x = ________

Check with your teacher before continuing.

The printing industry, like many trades, has a language all its own. An example is the point system. The point system is the standard of measure adopted by the industry for the measurement of type, printing, and spacing materials. The example below shows that 12 points make one pica, six picas make one inch. Thus one inch consists of 72 points.


1 inch
6 picas
1 pica
12 points
72 points


6 POINTS NONPAREIL
12 POINTS 1 PICA
6 PICAS 1 INCH

PRINTER'S POINT SYSTEM OF MEASURE

The standard printers' measures are as follows:

6 picas equals 1 inch
12 points equals 1 pica
72 points equals 1 inch (approx.)
6 points equals 1 nonpareil (half pica)
1 point equals about 1/72 inch

From the table answer the following: (Change points to picas.)

10. 27 points = a._____ picas and b._____ points

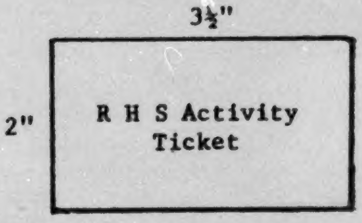
11. A 10-inch page contains _____ points

12. One point consists of _____ of an inch

13. 33 points = a._____ picas, b.____ nonpareil, and c._____ points

14. 36 picas = _______inches

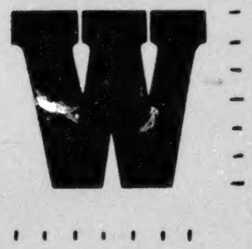
15. What is the size in picas of the ticket layout shown below if it measures 3½" x 2"?_______


3½"
2"
R H S Activity
Ticket

Bruce was taken to the back room where the printing was done. He met Mr. Coleman, one of the typesetters. He was in the process of figuring the amount of space necessary for a job. He informed Bruce that the printer measures set type in terms of its area. In most trades, the unit of measure for area is square inches or square feet. The printers' unit of measure is the em. The size of the printers' em varies with each size of type, so that the size of type used must be known before the area in ems can be determined. Mr. Coleman said that two very important rules must be followed.

One is that

an em is the square of the size (in points) of the type to be used.



$$\frac{6 \text{ (length in points)}}{6 \text{ (size of type)}} = 1 \text{ em}$$

Sample: How many ems of 9-point type can be set in a line 6" long?

a. Change length of line to points: 6" x 72 points = 437 points

b. Divide by size of type used: 432 ÷ 9 = 48 ems

Thus an eight-point em, used for measuring areas of eight-point type, is eight points square and a 12-point em is 12 points square.

The smallest area a printer measures is usually the area of a single line of type.

Thus the second important rule is

> the number of ems of type in a line is found by changing the length of the line to points and then dividing by the size of type used.

Mr. Colemen asked Bruce to find the ems in each of the following lines:

16. How many ems are in a six-pica line (change picas to points) with six-point type?_______

17. If a line of 12-point type measures seven picas, six points, how many ems does it contain?________

18. What is the length in inches, of a line of 8-point type containing 45 ems?______(Hint: use the formula $\frac{\text{number of points in line}}{\text{size of type}} =$ number of ems to find the number of points in the line. Then change from points to inches, using 1" = 72 points.)

19. If the width of the line is 30 picas, and the type size is six point, the line contains________ems.

Bruce then went to another section of the shop that handles the paper needs.

He met Mr. Thomas, who told him that paper comes from paper-making machines in different thicknesses and widths. The finished paper of one thickness is cut into standard widths by a machine and then into standard lengths. A table of common terms used in connection with paper stock was given to Bruce.

1 package of paper stock (often called one ream) = 500 sheets

1 box of commercial envelopes = 500 envelopes

1 carton = 1 printer's bundle = 125 pounds

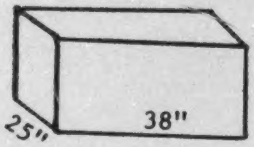
4 cartons (or bundles) = 1 case = 500 pounds

With information from the above table Bruce was asked to answer the following questions: See if you can work these problems. Check your answers.

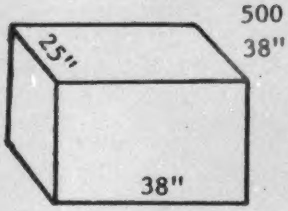
20. An order calls for 800 sheets of paper. How many full packages are needed to meet this order?________

21. An order calls for 6,000 sheets of paper.
    a. How many full packages is this?_______
    b. How many cartons? (assume 12.5 lbs. per package)_________
    c. Is there enough for a case?__________

Mr. Thomas was glad to see Bruce's interest, so he continued. He said that paper thickness is designated by the weight of 500 sheets of one of the 17 basic sizes. For example, printers would not say that a 25" x 38" sheet is 1/100 of an inch; they would say that 500 sheets of 25" x 38" paper weighs 60 pounds. Therefore, if 500 sheets of another package of 25" x 38" paper weighs 80 pounds, this package would have thicker paper than the first.



500 sheets 25" x 38" = 60 lbs.



500 sheets 25" x 38" = 80 lbs.

Mr. Thomas asked Bruce to circle the weight of the ream of paper that would have thicker individual sheets for each size. Which ones should be circled?

	size	weight per ream		
22.	28" x 42"	148	198	245
23.	35" x 45"	198	266	332

Mr. Thomas further explained that the weight of the paper (which indirectly gives you thickness) is given in many ways. Two of the usual ways are 1) directly after the length and width measurement; example, 17 x 22 -16. The -16 means 16 pounds per ream. Or 2) it is given as a substance; example, substance 16 means 16 pounds per ream. A common label found on a package of paper follows:

17 x 22 substance 16	Jones Paper Company	one ream

If you wanted a thicker paper, which of the following would positively be thickest. Circle that one.

24. a. 17 x 22 - 32 b. 17 x 22 substance 12 c. 20 x 32 substance 18

(Check your answer immediately.)

Bruce thanked Mr. Thomas and Mr. Coleman for the information they gave him. He went back to school with a much greater insight into the newspaper business. He realized many people that most of us do not see are involved in the final product.

Your teacher has examples of packages of paper, or he will tell you where to go to find them. List the length, width, and substance for each of them.

1.______________ 2.______________ 3.______________ 4.______________

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 1

Personal Finances

"Doris! We've got to sit down and do some money planning. Every month so far we've over spent! We were going to save about $50 a month and we haven't even come close!"

"If you hadn't bought that motor analyzer for $50 we would have saved $50!" said Doris.

"Well, what about that new coat you just had to have?" replied Larry.

"We're not getting anyplace arguing about it. Why don't we work out a budget?"

"Hey, that's a good idea," replied Larry, "we'll soon know if we can afford that new sofa or not."

"Let's use these guidelines for budgeting I picked up at the bank when we opened our new checking account last week," said Doris.

Doris and Larry sat down and looked at the bank's suggested guideline for people in the $8,000 to $10,000 income bracket.

Food	8-15%
Clothing and upkeep	5-10%
Shelter (including utilities)	20-25%
Home furnishings	5-10%
Transportation	15-20%
Savings and insurance	0-10%
Recreation	2-5%
Medical care	2-5%
Personal allowance	5-10%

Larry's gross income is $600 a month and his net income (after deductions) is $420. Doris's gross income is $400 a month, and her net income is $300 a month. This would give them a net monthly income of 1.__________.

Larry and Doris had made a budget for each of the eight categories the bank had itemized. They felt their budget reflected an adequate amount of money needed for each. They did not consider any percentages or totals. Larry decided to figure the percentage they would spend for each category with their proposed budget and compare them with the bank's suggestions. He made a chart using the following figures:

PERCENTAGE OF TAKE HOME PAY FOR EACH OF EIGHT CATEGORIES

Category	Budget	Percentage of Net Salary
Food	$80	2.__________
Clothing	$40	3.__________
Shelter	$183.60	4.__________
Home furnishings	$36	5.__________
Transportation	$175.89	6.__________
Savings and insurance	$50	7.__________
Recreation	$40	8.__________
Medical care	0	9.__________
Personal allowance (beauty parlor, hair cuts, lunches)	$50	10.__________

Total budget 11.__________ Total % of net pay budgeted 12.__________

Larry was amazed at the results. He noted that according to these figures they should have 13. a.$__________ unbudgeted or b.__________ % of the take home pay. "Then why weren't we able to save any money last week?" exclaimed Doris.

"I guess we spent money on things that were not budgeted, such as the motor analyzer and your new outfit. Perhaps we can take about $65 of takehome pay not assigned to a specific category and place it in savings for such items."

"Yes, and it will help us towards the money needed for a sofa," said Doris. The sofa they were interested in was priced at $310. "How many months would it take us to save for it if we deposited $65 a month towards the purchase?" she asked. "Let's divide $65 into $310; the answer should give us the number of months we need to wait. As a fraction that would be 14. a.__________ months or, rounded to the nearest month b.__________ months." advised Larry.

"Gee, that's an awfully long time to wait. Can't we borrow the money and get it now?"

Larry thought for a while and said, "That will mean an additional charge for interest. The average rate is 10 percent per year. So if I used the formula I = prt, where I is the interest, p is the principal or amount borrowed, r is the rate of interest, and t is the time the money is borrowed in years, we could determine the amount of interest on a $310 loan for 6 months. The equation would be

I = ________ x ________ x ________ = 15.__________
p r t interest

This means that the $310 sofa would actually cost us 16.__________

"Well, I guess we'll have to decide if the use of the sofa for the next six months is worth the extra charge," Doris sighed.

After just a short time of marriage, Larry and Doris have discovered the complex problem of budgeting. Weighing needs and desires with actual income creates many interesting situations and requires some deep thinking.

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 2

Selecting a Home

One of the problems that Larry and Doris had to decide upon was their living arrangements. Previous to their marriage, both had roomed with others in order to cut expenses. With the approaching marriage, Doris had been able to find a small apartment with no lease to get them started. They had both saved some money before their marriage and did not know whether or not to buy a house right away. Doris remembered from her home economics courses that a family should not spend more than one-fourth of their gross monthly income for housing expenses. A bit of checking with her friends reminded her that housing expenses included both the payments for the home as well as utilities and maintenance.

To determine just how much money they have available, Larry calculated that his gross monthly salary was $600 and Doris' was $400, which gave them a combined gross of 1.__________. Taking one-fourth of this would allow them to spend 2.__________ for house expenses.

Since they were interested in finding what part of their take-home pay this represented, they found that Larry's take-home pay, after the 30 percent deductions for taxes, insurance, and miscellaneous were taken from it, was 3.__________. This represented deductions of 4.__________ each month for Larry.

Doris' salary of $400 per month had deductions of 25 percent for taxes, etc., totalling 5.__________; this would result in a take-home pay of 6.__________. If they added the two salaries together, they would have 7.__________.

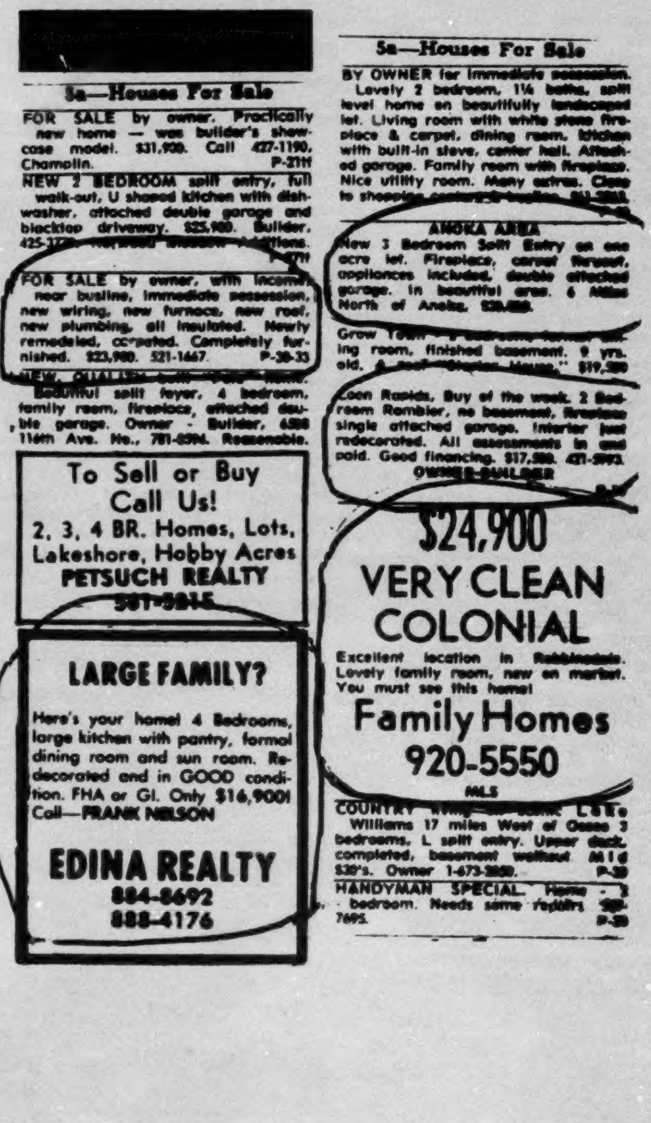
It didn't take them too long to figure out that the 8. $_________ for house expenses actually came to 9.__________ percent of their take-home pay. This wasn't pleasant news, but they still wanted to buy a house, so the next step was to determine just what they could afford.

Larry did a bit of checking with friends, older relatives, and parents of friends to learn what a realistic average for utilities would be:

Heating (gas)	$17 per month
Electricity	$11
Telephone (private line)	$ 6.44
Water/sewer	$ 2.25
Total 10.	__________

In addition to this, Larry told Doris that they would need to figure about $10 per month for maintenance on a home. This wasn't really much, but Larry thought he would be able to do most of the work himself. Adding these two figures together, Larry came up with 11.__________ for utilities. Since one-fourth of their monthly gross was 12.__________, this would leave 13.__________ for allowable monthly house payments.

With this information, they set out to search the house market for their "dream home," or the first step toward this home. They realized that the first home they buy may not have all the room they would like to have in the future; however, owning their own home would put them in a better financial position than renting. They checked a number of ads, some of which are given here, and began looking. It didn't take too long for them to find out that the "real buy" for $16,900 just didn't suit their needs. They liked the three-bedroom, split-entry in Anoka for $30,000 very much, though they realized that the home they'd buy would be one of the others.



[redacted]

5a—Houses For Sale

FOR SALE by owner. Practically new home — was builder's showcase model. $31,900. Call 427-1190, Champlin. P-21ff

NEW 2 BEDROOM split entry, full walk-out, U shaped kitchen with dishwasher, attached double garage and blacktop driveway. $25,900. Builder, 425-37[illegible] [illegible] Additions. P-[illegible]

FOR SALE by owner, with income, near busline, immediate possession, new wiring, new furnace, new roof, new plumbing, all insulated. Newly remodeled, carpeted. Completely furnished. $23,900. 521-1467. P-30-33

NEW, QUALITY [illegible] home. Beautiful split foyer, 4 bedroom, family room, fireplace, attached double garage. Owner - Builder, 6588 116th Ave. No., 781-6394. Reasonable.

To Sell or Buy Call Us!
2, 3, 4 BR. Homes, Lots, Lakeshore, Hobby Acres
PETSUCH REALTY
561-5815

LARGE FAMILY?

Here's your home! 4 Bedrooms, large kitchen with pantry, formal dining room and sun room. Redecorated and in GOOD condition. FHA or GI. Only $16,900! Call—FRANK NELSON

EDINA REALTY
884-8692
888-4176

5a—Houses For Sale

BY OWNER for immediate possession. Lovely 2 bedroom, 1½ baths, split level home on beautifully landscaped lot. Living room with white stone fireplace & carpet, dining room, kitchen with built-in stove, center hall. Attached garage. Family room with fireplace. Nice utility room. Many extras. Close to shopping center [illegible]

ANOKA AREA
New 3 Bedroom Split Entry on one acre lot. Fireplace, carpet throughout, appliances included, double attached garage. In beautiful area. 6 Miles North of Anoka. [illegible]

Grow [illegible] ing room, finished basement. 9 yrs. old. [illegible] House." $19,[illegible]

Coon Rapids. Buy of the week. 2 Bedroom Rambler, no basement, fireplace, single attached garage. Interior just redecorated. All assessments in and paid. Good financing. $17,500. 421-5950.
OWNER-BUILDER

$24,900
VERY CLEAN COLONIAL
Excellent location in Robbinsdale. Lovely family room, new on market. You must see this home!
Family Homes
920-5550
MLS

COUNTRY [illegible] Lake Williams 17 miles West of Osseo 3 bedrooms, L split entry. Upper deck completed, basement walkout. Mid $30's. Owner 1-673-[illegible]. P-30

HANDYMAN SPECIAL. Home - 3 bedroom. Needs some repairs. [illegible]-7695. P-30

The next step was a visit to the savings and loan association to see what they could raise and what their payments would be.

In addition to the down payment, the taxes and insurance would need to be known to determine their monthly payment. They could finance a home by either FHA or conventional. The easiest to calculate was the required down payment for a conventional loan. The cost of their homes ranged from $17,500 to $30,000. Conventional loans required a 25 percent down payment; this meant a down payment of at least 14.__________ to as much as 15.__________.

The buyer normally would also have to pay one point for closing costs, or costs of doing all the paperwork involved. A point means 1 percent and it is a charge levied to bring the bank's return on mortgage money up to the level of other ways of investing their money. On the particular homes in question, this meant an additional 16.__________ to 17.__________, bringing the down payments required to a low of 18.__________ and a high of 19.__________. Larry remarked to Doris that he could see they would have problems.

They asked Mr. Wise, the one they were consulting, what other avenues were available. He mentioned FHA and VA; however, VA-backed financing was not available since Larry was not a veteran. The down payment required for FHA-backed financing could be calculated according to the following schedule:

3 percent of first $15,000
10 percent of next $5,000
20 percent of anything above $20,000

The down payment for the $17,500 home would be calculated in this way:

3 percent of $15,000 = 20.__________
10 percent of $2,500 = 21.__________
Total = 22.__________

To this, they would need to add closing costs of one point, or 23.__________.
Consequently, total money needed would be 24.__________.

Find what is needed for the other homes:

$23,900

3% of $15,000 = 25.______
10% of $5,000 = 26.______
20% of $3,900 = 27.______
Down payment = 28.______
Closing cost = 29.______
Total = 30.______

$24,900

3% of $15,000 = 31.______
10% of $5,000 = 32.______
20% of $4,900 = 33.______
Down payment = 34.______
Closing cost = 35.______
Total = 36.______

$30,000

3% of $15,000 = 37.______
10% of $5,000 = 38.______
20% of $10,000 = 39.______
Down payment = 40.______
Closing cost = 41.______
Total = 42.______

Another thing that Larry and Doris learned was that the monthly payments actually included four items. The term PITI refers to principal, interest, taxes, and insurance. The taxes for a year are spread evenly over a 12-month period and the same thing is done for the insurance for the home. Putting the information in the form of a chart for comparison purposes yielded:

Taxes   Insurance   Total 1 yr.   Monthly

a. $17,500 home: $420 + $120 = 43.__________ ÷ 12 = 44.__________

b. $23,900 home: $600 + $110 = 45.__________ ÷ 12 = 46.__________

c. $24,900 home: $550 + $120 = 47.__________ ÷ 12 = 48.__________

d. $30,000 home: $850 + $158 = 49.__________ ÷ 12 = 50.__________

The variations in taxes and insurance costs for a year come from the different tax bases in the various communities as well as the different classifications for fire insurance.

Larry checked the figures that he and Doris had originally come up with for allowable monthly payments with their income and found it to be $203.31. He made another chart to determine what would be available for principal and interest payments:

Monthly ins. & taxes

a. $17,500 house: $203.31 - 51.__________(44.) = 52.__________

b. $23,900 house: $203.31 - 53.__________(46.) = 54.__________

c. $24,900 house: $203.31 - 55.__________(48.) = 56.__________

d. $30,000 house: $203.31 - 57.__________(50.) = 58.__________

UNIT 14-2

Larry and Doris would be able to finance at 8%, and the next step was to determine just what amount they could finance for each house and remain in their limits; then determine what down payment would be required to keep their monthly payments within their limitations. Larry obtained a monthly loan amortization payments schedule. He was interested in having the loan for the maximum 25 years to make his monthly payments as low as possible. Checking the payments for $20,000 at 8% for 25 years, the monthly payment would be $154.37, well below the figure allowable for the $17,500 home, especially when they considered they would be financing $17,500 minus the down payment. However, that home would require Larry to drive 30 miles one way to work and Doris 25 miles one way. Also, the house required quite a bit more work than either Larry or Doris wanted, so that choice was eliminated.

8% MONTHLY PAYMENT
NECESSARY TO AMORTIZE A LOAN

TERM AMOUNT	18 YEARS	19 YEARS	20 YEARS	21 YEARS	22 YEARS	23 YEARS	24 YEARS	25 YEARS
$ 100	.88	.86	.84	.83	.81	.80	.79	.78
200	1.75	1.71	1.68	1.65	1.62	1.59	1.57	1.55
300	2.63	2.57	2.51	2.47	2.42	2.39	2.35	2.32
400	3.50	3.42	3.35	3.29	3.23	3.18	3.13	3.09
500	4.38	4.28	4.19	4.11	4.04	3.97	3.92	3.86
600	5.25	5.13	5.02	4.93	4.84	4.77	4.70	4.64
700	6.13	5.99	5.86	5.75	5.65	5.56	5.48	5.41
800	7.00	6.84	6.70	6.57	6.45	6.35	6.26	6.18
900	7.88	7.70	7.53	7.39	7.26	7.15	7.04	6.95
1000	8.75	8.55	8.37	8.21	8.07	7.94	7.83	7.72
1100	9.63	9.40	9.21	9.03	8.87	8.73	8.61	8.49
1200	10.50	10.26	10.04	9.85	9.68	9.53	9.39	9.27
1300	11.38	11.11	10.88	10.67	10.49	10.32	10.17	10.04
1400	12.25	11.97	11.72	11.49	11.29	11.11	10.95	10.81
1500	13.13	12.82	12.55	12.31	12.10	11.91	11.74	11.58
1600	14.00	13.68	13.39	13.13	12.90	12.70	12.52	12.35
1700	14.88	14.53	14.22	13.95	13.71	13.49	13.30	13.13
1800	15.75	15.39	15.06	14.77	14.52	14.29	14.08	13.90
1900	16.63	16.24	15.90	15.59	15.32	15.08	14.86	14.67
2000	17.50	17.10	16.73	16.41	16.13	15.87	15.65	15.44
2100	18.38	17.95	17.57	17.23	16.93	16.67	16.43	16.21
2200	19.25	18.80	18.41	18.05	17.74	17.46	17.21	16.98
2300	20.13	19.66	19.24	18.87	18.55	18.25	17.99	17.76
2400	21.00	20.51	20.08	19.70	19.35	19.05	18.77	18.53
2500	21.88	21.37	20.92	20.52	20.16	19.84	19.56	19.30
2600	22.75	22.22	21.75	21.34	20.97	20.63	20.34	20.07
2700	23.63	23.08	22.59	22.16	21.77	21.43	21.12	20.84
2800	24.50	23.93	23.43	22.98	22.58	22.22	21.90	21.62
2900	25.38	24.79	24.26	23.80	23.38	23.02	22.68	22.39
3000	26.25	25.64	25.10	24.62	24.19	23.81	23.47	23.16
3100	27.13	26.49	25.93	25.44	25.00	24.60	24.25	23.93
3200	28.00	27.35	26.77	26.26	25.80	25.40	25.03	24.70
3300	28.88	28.20	27.61	27.08	26.61	26.19	25.81	25.47
3400	29.75	29.06	28.44	27.90	27.42	26.98	26.59	26.25
3500	30.63	29.91	29.28	28.72	28.22	27.78	27.38	27.02
3600	31.50	30.77	30.12	29.54	29.03	28.57	28.16	27.79
3700	32.38	31.62	30.95	30.36	29.83	29.36	28.94	28.56
3800	33.25	32.48	31.79	31.18	30.64	30.16	29.72	29.33
3900	34.13	33.33	32.63	32.00	31.45	30.95	30.51	30.11
4000	35.00	34.19	33.46	32.82	32.25	31.74	31.29	30.88
4100	35.88	35.04	34.30	33.64	33.06	32.54	32.07	31.65
4200	36.75	35.89	35.14	34.46	33.86	33.33	32.85	32.42
4300	37.63	36.75	35.97	35.28	34.67	34.12	33.63	33.19
4400	38.50	37.60	36.81	36.10	35.48	34.92	34.42	33.96
4500	39.38	38.46	37.64	36.92	36.28	35.71	35.20	34.74
4600	40.25	39.31	38.48	37.74	37.09	36.50	35.98	35.51
4700	41.13	40.17	39.32	38.57	37.90	37.30	36.76	36.28
4800	42.00	41.02	40.15	39.39	38.70	38.09	37.54	37.05
4900	42.88	41.88	40.99	40.21	39.51	38.88	38.33	37.82
5000	43.75	42.73	41.83	41.03	40.31	39.68	39.11	38.60
5100	44.63	43.58	42.66	41.85	41.12	40.47	39.89	39.37
5200	45.50	44.44	43.50	42.67	41.93	41.26	40.67	40.14
5300	46.38	45.29	44.34	43.49	42.73	42.06	41.45	40.91
5400	47.25	46.15	45.17	44.31	43.54	42.85	42.24	41.68
5500	48.13	47.00	46.01	45.13	44.34	43.64	43.02	42.45

MONTHLY PAYMENT **8%**
NECESSARY TO AMORTIZE A LOAN

TERM AMOUNT	18 YEARS	19 YEARS	20 YEARS	21 YEARS	22 YEARS	23 YEARS	24 YEARS	25 YEARS
$ 5600	49.00	47.86	46.85	45.95	45.15	44.44	43.80	43.23
5700	49.88	48.71	47.68	46.77	45.96	45.23	44.58	44.00
5800	50.75	49.57	48.52	47.59	46.76	46.03	45.36	44.77
5900	51.63	50.42	49.35	48.41	47.57	46.82	46.15	45.54
6000	52.50	51.28	50.19	49.23	48.38	47.61	46.93	46.31
6100	53.38	52.13	51.03	50.05	49.18	48.41	47.71	47.09
6200	54.25	52.98	51.86	50.87	49.99	49.20	48.49	47.86
6300	55.13	53.84	52.70	51.69	50.79	49.99	49.27	48.63
6400	56.00	54.69	53.54	52.51	51.60	50.79	50.06	49.40
6500	56.88	55.55	54.37	53.33	52.41	51.58	50.84	50.17
6600	57.75	56.40	55.21	54.15	53.21	52.37	51.62	50.94
6700	58.63	57.26	56.05	54.97	54.02	53.17	52.40	51.72
6800	59.50	58.11	56.88	55.79	54.83	53.96	53.18	52.49
6900	60.38	58.97	57.72	56.61	55.63	54.75	53.97	53.26
7000	61.25	59.82	58.56	57.43	56.44	55.55	54.75	54.03
7100	62.13	60.67	59.39	58.26	57.24	56.34	55.53	54.80
7200	63.00	61.53	60.23	59.08	58.05	57.13	56.31	55.58
7300	63.88	62.38	61.07	59.90	58.86	57.93	57.09	56.35
7400	64.75	63.24	61.90	60.72	59.66	58.72	57.88	57.12
7500	65.63	64.09	62.74	61.54	60.47	59.51	58.66	57.89
7600	66.50	64.95	63.57	62.36	61.27	60.31	59.44	58.66
7700	67.38	65.80	64.41	63.18	62.08	61.10	60.22	59.43
7800	68.25	66.66	65.25	64.00	62.89	61.89	61.01	60.21
7900	69.13	67.51	66.08	64.82	63.69	62.69	61.79	60.98
8000	70.00	68.37	66.92	65.64	64.50	63.48	62.57	61.75
8100	70.88	69.22	67.76	66.46	65.31	64.27	63.35	62.52
8200	71.75	70.07	68.59	67.28	66.11	65.07	64.13	63.29
8300	72.63	70.93	69.43	68.10	66.92	65.86	64.92	64.07
8400	73.50	71.78	70.27	68.92	67.72	66.66	65.70	64.84
8500	74.38	72.64	71.10	69.74	68.53	67.45	66.48	65.61
8600	75.25	73.49	71.94	70.56	69.34	68.24	67.26	66.38
8700	76.13	74.35	72.78	71.38	70.14	69.04	68.04	67.15
8800	77.00	75.20	73.61	72.20	70.95	69.83	68.83	67.92
8900	77.88	76.06	74.45	73.02	71.75	70.62	69.61	68.70
9000	78.75	76.91	75.28	73.84	72.56	71.42	70.39	69.47
9100	79.63	77.76	76.12	74.66	73.37	72.21	71.17	70.24
9200	80.50	78.62	76.96	75.48	74.17	73.00	71.95	71.01
9300	81.38	79.47	77.79	76.30	74.98	73.80	72.74	71.78
9400	82.25	80.33	78.63	77.13	75.79	74.59	73.52	72.56
9500	83.13	81.18	79.47	77.95	76.59	75.38	74.30	73.33
9600	84.00	82.04	80.30	78.77	77.40	76.18	75.08	74.10
9700	84.88	82.89	81.14	79.59	78.20	76.97	75.86	74.87
9800	85.75	83.75	81.98	80.41	79.01	77.76	76.65	75.64
9900	86.63	84.60	82.81	81.23	79.82	78.56	77.43	76.41
10000	87.50	85.46	83.65	82.05	80.62	79.35	78.21	77.19
11000	96.25	94.00	92.01	90.25	88.68	87.28	86.03	84.90
12000	105.00	102.55	100.38	98.46	96.75	95.22	93.85	92.62
13000	113.75	111.09	108.74	106.66	104.81	103.15	101.67	100.34
14000	122.50	119.64	117.11	114.86	112.87	111.09	109.49	108.06
15000	131.25	128.18	125.47	123.07	120.93	119.02	117.31	115.78
16000	140.00	136.73	133.84	131.27	128.99	126.96	125.13	123.50
17000	148.75	145.27	142.20	139.48	137.06	134.89	132.95	131.21
18000	157.50	153.82	150.56	147.68	145.12	142.83	140.77	138.93
19000	166.25	162.36	158.93	155.89	153.18	150.76	148.60	146.65
20000	175.00	170.91	167.29	164.09	161.24	158.70	156.42	154.37

Larry then prepared the following chart to help them see where they stood.

	Amount Allowable	Amount Financed	Down Payment Needed
a. $23,900 home:	59.________ (54.)	⇒ 60.__________	⇒ 61.____________
b. $24,900 home:	62.________ (56.)	⇒ 63.__________	⇒ 64.____________
c. $30,000 home:	65.________ (58.)	⇒ 66.__________	⇒ 67.____________

To compare your calculations:

a. Amount allowable = $144.14

b. Amount financed = $18,000 = $138.93
600 = 4.64
$143.57 ($18,700 = $144.34 -- too high)

c. Down payment needed = $23,900 - $18,600 = $5,300

Larry and Doris were disappointed, to say the least. They hadn't expected to be able to buy the $30,000 home, but with only $2,374.10 in savings, they realized that if they were to be able to handle the monthly payments, the only house available to them was the one in the country and both distance and other factors outweighed the financial advantages of that choice.

Mr. Wise told them that they could perhaps assume the mortgage on an existing house if the seller agreed. The plus factor of doing that would be a lower percent of interest and consequently lower monthly payments. The negative factor was that this arrangement required a higher down payment, which was already beyond their means. Their best decision, Mr. Wise pointed out, would be to remain a year or so in their apartment, save their money, and consider purchasing then.

The rent in their apartment, which had the use of a pool and a garage for each apartment, was $166 a month. This included the heat and water and sewer. The only other "utilities" would be their electric bill of about $11 a month and their phone bill, which was $6.60 in that area. Larry added these up and came to 68.__________.

"Well," he told Doris, "let's try to save as much of the difference between this figure and the $250 which we were basing our home-buying calculations on. In the meantime, this apartment is adequate and quite nice. The house will come later."

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 3

Food Purchase

"Our new home is really great. I just love it!"

Doris was phoning her former roommate. She was so excited! She and Larry had just moved into their first home.

"Are you really in a house or is it an apartment?"

"Larry found this apartment close to his work. It's small, but really nice. We've got to have you and some of the old gang over. Larry and I were talking about this just last night. Hey, what are you guys doing next weekend?"

"Nothing -- so far. Sounds like fun! Who are you inviting?"

"We were counting them up and I think it'll be about 16 in all. I sure hope Bill can come with you."

"Oh, he'll come! He's over every weekend and he hasn't called me yet about any other plans."

"Good! Say, I've got to go. I have to call the other girls, too. We'll plan on Saturday evening then at eight. OK?"

"Fine. I'll plan on that unless I hear from you. See you this weekend. Bye now."

Doris was able to get in touch with her friends and set firm plans. Now to sit down and start planning!

Larry came home just then. Saturday was his day to golf and he'd had a good round.

"Say Doris," he called, "did you get hold of the guys? What about next weekend?"

"Yes, I did, and it's on. What do you think we should plan for food?"

"Char-broiling hamburgers would be fun."

"Let's do something simple. You wouldn't be able to visit or anything. How about something I could prepare ahead of time?"

"Ya, say how about a cold meat salad or something."

"That's an idea. Mom has a real good chicken salad recipe I can get from her. I'll figure out the rest of the menu and call her."

Doris wrote out a light menu, since the food would be served later in the evening.

Chicken salad
Relishes -- carrots, celery, pickles, herring
Rolls, butter
Coffee
Creme de menthe sundaes

She called her mother and got this salad recipe.

1½ C. diced cooked chicken
1 C. chopped celery
½ C. grapes (halved)
1 T + 1 tsp. minced parsley
1/8 tsp. salt
1/16 tsp. pepper
¼ tsp. M.S.G.
½ C. salad dressing

"How many people will this recipe serve?"

"It makes four servings," replied her mother.

Doris realized she was going to have to change the recipe to make enough for the 16 people that were coming over.

If the recipe served four, then Doris will have to multiply the amount of each ingredient by 1.__________.

Increase the recipe so it will properly serve 16 people.

2. __________ diced cooked chicken
3. __________ chopped celery
4. __________ grapes (halved)
5. __________ minced parsley
6. __________ salt
7. __________ pepper
8. __________ M.S.G.
9. __________ salad dressing

Doris then made out a list for Larry of items he'd have to pick up at the market.

Her cook book stated that five pounds of chicken will yield four cups of cooked diced meat. How many pounds of chicken will she need for the salad? 10.______pounds. If a stewing chicken averages 3 3/4 pounds, Larry will buy 11.______ chickens. At 29 cents per pound, this amounts to 12.______.

One bunch of celery will yield two cups. How many bunches will Doris ask Larry to pick up for the salad? 13.__________ (She will need an extra bunch for the relish tray.) At 19 cents a bunch, this amounts to 14.__________ cents.

If one pound of grapes will yield 2½ cups halved, Larry will need to buy 15.__________ pound(s) at 35 cents a pound.

Doris had some minced parsley, but she measured it and found she would have to buy more. An eleven-ounce bottle costs 59 cents and is the smallest size she can buy. She has salt, pepper, coffee, and M.S.G. on hand but needs salad dressing. If one cup is a half pint, Doris will need 16.__________ pint(s). Larry noticed the prices on the salad dressing and saw that ½ pint cost 38 cents, one pint cost 47 cents and one quart cost 53 cents. Buying four ½-pint jars (one quart) will cost $1.52; two one-pint jars (one quart) will cost 94 cents; and the quart jar will cost 53 cents. Which would be the wisest (cost less) for Larry to buy? 17.__________

Carrots cost 19 cents a pound and Larry picked up one pound. Pickles cost 49 cents for a 24-ounce jar and she wanted one jar. Herring comes in two sizes: a six-ounce jar for 75 cents and 22-ounce jar for $1.75. The six-ounce jar costs 18.__________ per ounce and the 22-ounce jar costs 19.__________ per ounce. If each serving is one ounce, which jar should Larry buy? 20.__________

Doris wanted some rolls, so Larry priced bakery dinner rolls. A dozen cost 65 cents. Refrigerator rolls are 37 cents a dozen. Brown-and-serve are 39 cents a dozen. Larry asked whether refrigerator or brown-and-serve rolls were better. Bakery rolls cost too much as far as he was concerned.

"Brown-and-serve rolls are easier to prepare and serve warm," the counter girl told him.

"Good, I'll take three dozen then."

What was the cost of the rolls? 21.__________

Larry still had several items on his list. He picked up a pound of stick margarine for 59 cents. Also he needed ice cream. If one scoop of ice cream is one-half cup (one-fourth pint) and the average serving is two scoops, how many cups of ice cream will he need? 22.__________. This is 23.__________ pints or 24.__________ gallon(s). At $1.29 a gallon, this will cost 25.__________.

Now, all he had to pick up was the creme de menthe sauce. If each serving is two ounces, how many ounces will be needed for sixteen people? 26.__________ ounces. Creme de menthe sauce comes only in 10-ounce bottles. Three bottles would make 27.__________ ounces.

Do you think Larry should buy an extra bottle just to make up what he is short in the three bottles?_______________

Larry decided to pick up a fourth bottle since this would leave some sauce for other times. Four bottles at 59 cents each comes to 28.__________.

What was the total cost of the food Larry had to pick up for the party?

Item	Cost
Chicken	$______
Celery	______
Grapes	______
Parsley	______
Salad dressing	______
Carrots	______
Pickles	______
Herring	______
Rolls	______
Margarine	______
Ice cream	______
Creme de menthe sauce	______
Total 29.	$______

Doris prepared the chickens for stewing two days before the party. She didn't want to be working on the food on the day of the party, but also wanted to take no chance on spoilage.

It requires 15 minutes per pound to properly stew chicken. She has 30.______pounds of chicken, which will require 31.______ hours to cook.

Doris really enjoyed getting things ready for the party and it went very well. Seeing old friends have fun in their home was a feeling she had never experienced before. However, both she and Larry learned there was a lot involved in food purchasing and preparation.

Independent School District 281 Robbinsdale Area Schools

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 4

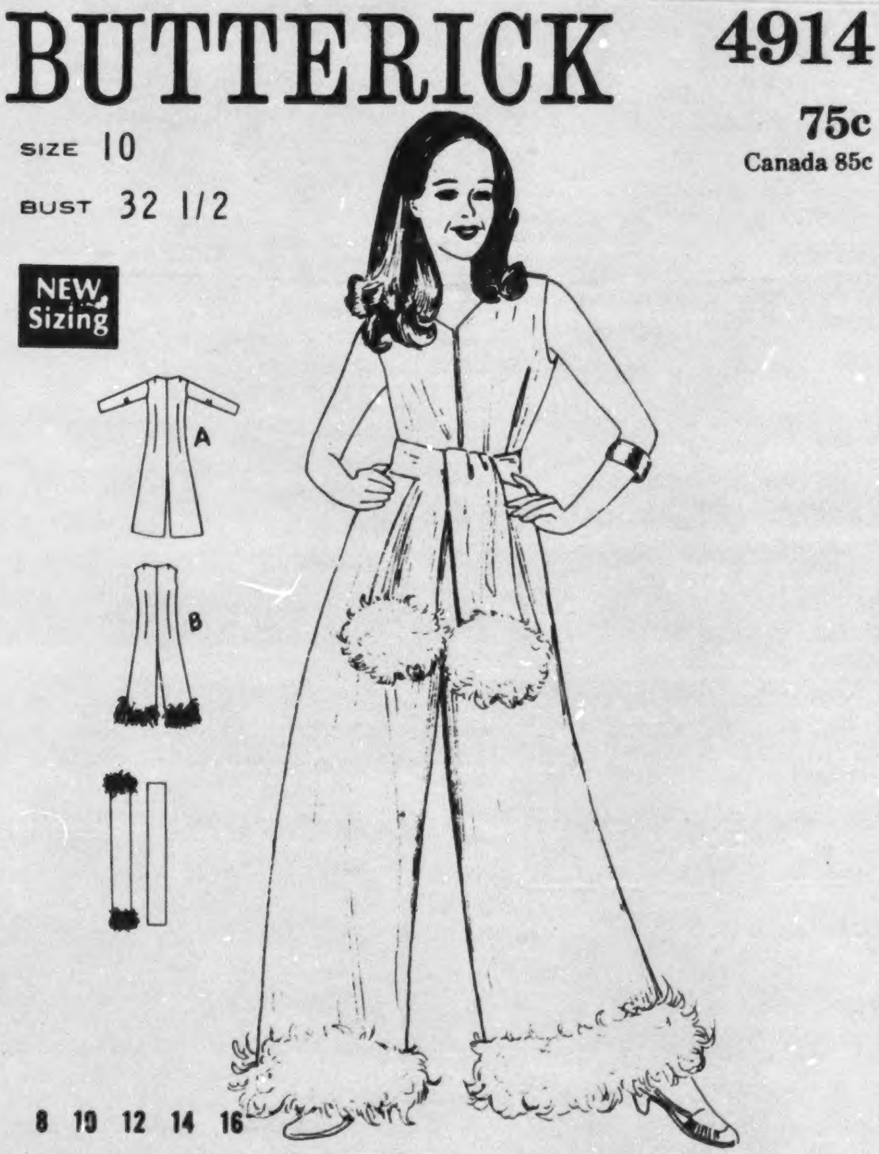
Clothing Construction

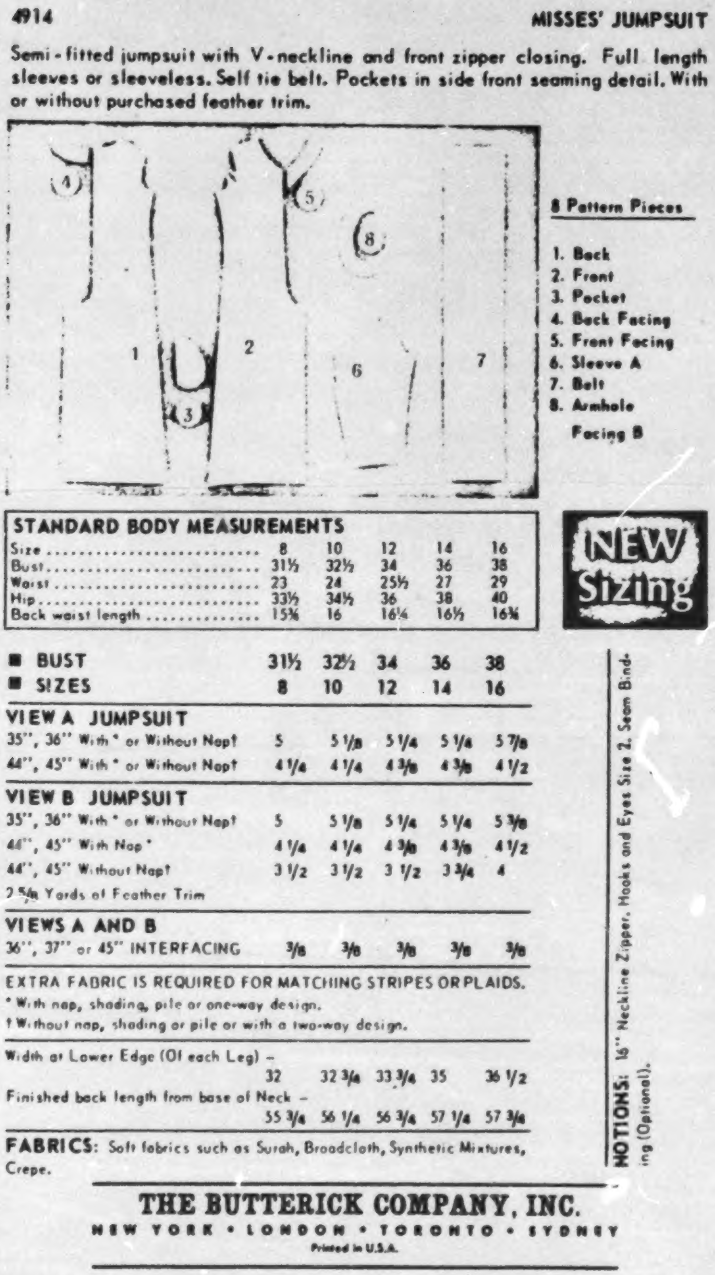
"The plans we're making for the party this weekend are going well. Sure wish I had something new to wear," said Doris, talking to her friend.

"I've got a pattern for a beautiful hostess gown that I've been going to make. It's not a hard one, either. Do you want to see it?"

"Sure! I love to sew."

Doris looked at the pattern and decided on view B as shown.


BUTTERICK
4914
75c
Canada 85c
SIZE 10
BUST 32 1/2
NEW Sizing
A
B
8 10 12 14 16


1
2
3
4
5
6
7
8
NEW Sizing

4914 **MISSES' JUMPSUIT**

Semi-fitted jumpsuit with V-neckline and front zipper closing. Full length sleeves or sleeveless. Self tie belt. Pockets in side front seaming detail. With or without purchased feather trim.

8 Pattern Pieces

1. Back
2. Front
3. Pocket
4. Back Facing
5. Front Facing
6. Sleeve A
7. Belt
8. Armhole Facing B

STANDARD BODY MEASUREMENTS

Size	8	10	12	14	16
Bust	31½	32½	34	36	38
Waist	23	24	25½	27	29
Hip	33½	34½	36	38	40
Back waist length	15¾	16	16¼	16½	16¾

■ **BUST**	31½	32½	34	36	38
■ **SIZES**	8	10	12	14	16
VIEW A JUMPSUIT					
35", 36" With * or Without Nap†	5	5 1/8	5 1/4	5 1/4	5 7/8
44", 45" With * or Without Nap†	4 1/4	4 1/4	4 3/8	4 3/8	4 1/2
VIEW B JUMPSUIT					
35", 36" With * or Without Nap†	5	5 1/8	5 1/4	5 1/4	5 3/8
44", 45" With Nap *	4 1/4	4 1/4	4 3/8	4 3/8	4 1/2
44", 45" Without Nap†	3 1/2	3 1/2	3 1/2	3 3/4	4
2 5/8 Yards of Feather Trim					
VIEWS A AND B					
36", 37" or 45" INTERFACING	3/8	3/8	3/8	3/8	3/8

EXTRA FABRIC IS REQUIRED FOR MATCHING STRIPES OR PLAIDS.
* With nap, shading, pile or one-way design.
† Without nap, shading or pile or with a two-way design.

Width at Lower Edge (Of each Leg) –	32	32 3/4	33 3/4	35	36 1/2
Finished back length from base of Neck –	55 3/4	56 1/4	56 3/4	57 1/4	57 3/4

FABRICS: Soft fabrics such as Surah, Broadcloth, Synthetic Mixtures, Crepe.

NOTIONS: 16" Neckline Zipper, Hooks and Eyes Size 2, Seam Binding (Optional).

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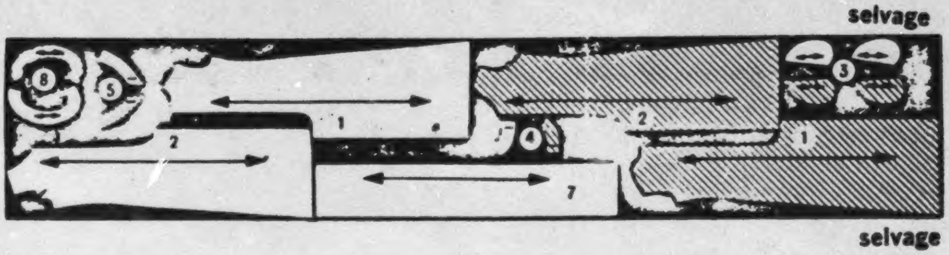
NEW YORK • LONDON • TORONTO • SYDNEY
Printed in U.S.A.

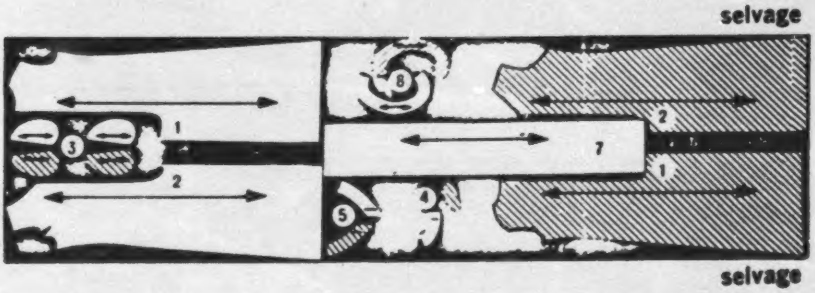
Doris' measurements indicate she would wear size 10, just her friend's size. She went to the fabric store and selected several floral crepe designs which were one-way prints. She found three pieces of fabric. One was 36 inches wide for $2 a yard. Another was 45 inches wide for $2.35 a yard and the third was also 45 inches wide for $3 a yard. She liked all three (continued on page four)

View B Jumpsuit

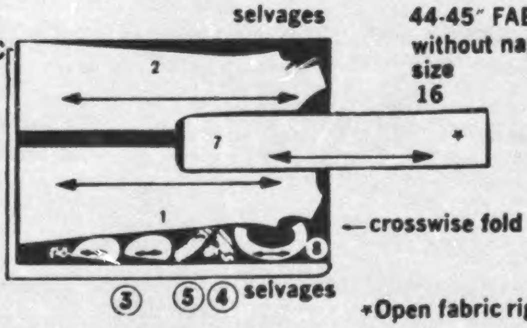
35-36" FABRIC
with or
without nap
all sizes


selvage
8
5
1
2
4
7
3
2
1
selvage

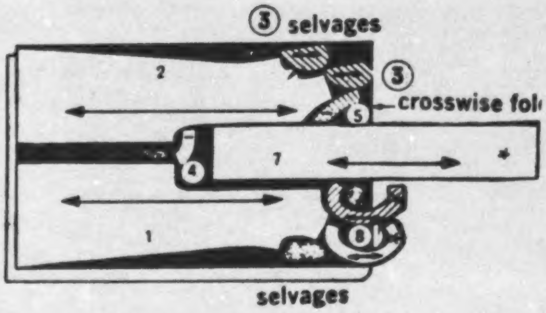
44-45" FABRIC
with nap
all sizes


selvage
1
3
2
8
7
2
1
5
4
selvage

44-45" FABRIC
without nap
sizes
8-10-12-14


selvages
2
7
*
1
crosswise fold
8
③
⑤ ④ selvages

44-45" FABRIC
without nap
size
16


③ selvages
2
③
crosswise fol
5
7
*
4
1
8
selvages

*Open fabric right side up and cut one

equally well, but wanted to spend as little as possible. On the pattern envelope back she noticed that because she had chosen a pattern with a one-way design she would have to buy the amount of fabric required by material with nap. This meant she would need 5 1/8 yards of 36 inch material or 4 1/4 yards of 45 inch material.

The 36 inch material at $2 per yard costs 1.__________.

The 45 inch material at $2.35 per yard costs 2.__________.

The 45 inch material at $3 per yard costs 3.__________.

Doris was hoping that she would spend only $10, but she still had to buy the zipper, thread, seam binding, and feather trim. She had hooks and eyes on hand. She chose the 45 inch material for $2.35.

2 5/8 yards of ostrich feather trim @ $4 = 4.__________

2 packages seam binding @ 39 cents = 5.__________

One spool of thread @ 29 cents

One 16 inch zipper @ 50 cents

The total cost of the hostess dress would now be 6.________ .

If she would choose maribou feather trim at $2 a yard, the gown would cost

7.__________.

Realizing either of these costs would be somewhat over her budget, she decided to make the gown without trim and possibly add it on later.

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 5

Buying and Caring for a Car

Doris and Larry were recently married. Both owned cars previous to their marriage, Larry a 1971 Chevrolet Impala and Doris a 1969 Oldsmobile Cutlass. Before marriage they thought little about car payments and upkeep costs, but their decision to run their new household on a budget forced consideration of them. The possibility of buying and furnishing a home as well as anticipation of children and the loss of Doris' income contributed to the decision of budgeting their money.

Doris' monthly gross income from her secretarial job is $400. She figures 25 percent of her salary is deducted for taxes and insurance. This means that $100 (25 percent of $400) is deducted from her gross income to bring her net take-home pay to $300.

Larry's gross monthly income, after his last raise, is $600. He figures an average of 30 percent of his wages are deducted for taxes, insurances, and savings bonds. His net monthly salary (gross salary minus deductions) would be 1.__________. This ıld mean his average weekly take-home pay would be 2.__________.

Together, their net monthly income is 3.__________. Doris was quick to caution Larry that it would be a mistake to count on this amount forever, because they were not sure how long her income would continue. So they agreed to assume the double income would be available for two years.

Larry has 11 monthly payments of $87.50 left on his car. To help determine the insurance costs of the cars, he invited the insurance agent over and explain the rates. Larry had been paying $140 every six months and Doris $130 every six months. When the agent arrived and found Larry was married, he said an automatic reduction was due because of the different classification. It seems that statistics show a married person does less traveling and has fewer accidents than an unmarried person. The new rate for Larry would be approximately $100, or $40 less than before. This is a 4.__________ percent reduction (round off) in rates per six months. Because Doris is married, her $130 rate would be reduced by the same percentage, which would bring her six-month rate to 5.__________.

Their agent also said that because they are a two-car family, an additional 10 percent reduction per car is given, because of probable less use of either car. This would bring Larry's six-month premium to 6.__________ and Doris' to 7.__________. The total six-month premium for both cars is 8.__________ or 9.__________ per year. Larry then divided this by 12 to get the per month figure (for purposes of budgeting). The per month cost of insuring both cars is 10.__________.

The next expense Larry thought to include in the budget was gas. He had been averaging about 1,200 miles per month on his car. Doris, who usually takes a bus to work, averaged slightly more than 720 miles per month. These figures would have Larry driving 11.__________ miles per year and Doris 12.__________ miles per year.

At this point Doris asked if the mileage (miles per gallon) her car got would affect the budget. Larry said they would need to approximate what the gas mileage of each car is in order to continue their figuring. The Chevrolet would be easy, as they used it on their honeymoon and kept records of gas purchases. They drove a total of 3,200 miles and purchased 188 gallons of gas.

Using the formula MPG = $\frac{\text{distance driven}}{\text{gas consumed}}$, Larry inserted his figures and got MPG = $\frac{3{,}200}{188}$ or 13.__________ MPG (round off to nearest whole gallon. Much of this driving was on the highway, so Larry decided that a true average (highway and city driving) would be two MPG less or 14.__________ MPG. They did not have any accurate figures for the Oldsmobile, but Doris thought a 13 MPG average was close.

To find the number of gallons used per month by each car, Larry divided the number of miles driven per month by the miles per gallon rate of each car. The formula would be gallons used (GU) = miles driven ÷ MPG.

15. The Chev's formula would be GU = ______________ ÷ __________ = __________
Miles per month MPG

16. The Olds' formula would be GU = ______________ ÷ __________ = __________
(round off to nearest whole gallon)

Now that they have determined the amount of gasoline used per month they can find the monthly expense by determining the per gallon cost of gas.

Due to the constant fluctuation of gas prices, Larry thought it best to set an average price per gallon. Then whatever is left or owing each month in the budget should balance at the end of a year. Recent gas prices (rounded to nearest cent) that Larry could remember were 28 cents, 35 cents, 33 cents, 32 cents, 29 cents, and 41 cents. Assuming each price was in effect the same length of time (each four weeks for a total of 17.__________ months) what was the average price for this period of time? 18.__________

Larry devised the formula: monthly cost of gas (MC) equals number of gallons used (GU) times cost per gallon (CPG) or MC = GU x CPG. Larry inserted the figures he previously found and came up with these formulas:

The Chevrolet's MC = $\underset{\text{GU}}{\underline{\qquad}}$ x $\underset{\text{CPG}}{\underline{\qquad}}$ = 19.__________.

The Oldsmobile's MC = $\underset{\text{GU}}{\underline{\qquad}}$ x $\underset{\text{CPG}}{\underline{\qquad}}$ = 20.__________.

Together, the total amount to be budgeted for gas per month is 21.__________.

Larry noted they now have the monthly insurance premiums figured as well as gas costs. Miscellaneous items such as oil changes, lubrication, batteries, and tires are more difficult to budget. Doris felt that some provision should be made for these so that, should they come up, money would be available. They mutually agreed on budgeting another $15 per month for these items for both cars.

Larry's and Doris' car budget sheet would look like this:

CAR BUDGET SHEET

Insurance Premiums ____________ (Answer 10)

Monthly Cost of Gas ____________ (Answer 21)

Miscellaneous ____________

'71 Chevrolet loan payment ____________

Total car budget 22.____________

Doris thought that this figure was quite large, but quickly noted that it is for both cars and is lower (due to lower insurance rates) than before marriage. Also, if both cars are kept after the 11 remaining payments for the Chevrolet are completed, the budget could be reduced to 23.__________.

With the car budgeting completed, Larry and Doris moved to a different area. For information on other areas of budgeting, check the "Personal Finance" and "Selecting a Home" units.

CLUSTER FOURTEEN -- HOME MANAGEMENT

Unit 6

Computing Take-home Pay

Doug had just completed his second week's work at the Sleepy Sam Snooze Shop and therefore received his first paycheck, one which covered his first week's work. There were a lot of deductions on his check stub which he didn't understand. In fact, he really didn't expect all of these things to be deducted from his weekly wages. He had always been told to ask questions whenever there were things he didn't understand, so the next day he went to Mr. Samuel to ask about all those deductions.

Doug's inquisitiveness about his paycheck impressed Mr. Samuel. Since a pregnancy was going to force an opening in the payroll and records department in a month or two, Mr. Samuel arranged to have Doug transferred to payroll for a couple of days to learn all that goes into tabulating take-home pay. He could then naturally fill the vacancy when it occurred.

One of the first things Doug had to learn was how to work with time cards. He knew that all employees of the Sleepy Sam Snooze Shop punched in and punched out each day and that they were paid an hourly rate. The sales people were paid a commission plus an hourly rate, but one thing he had realized right when he first started work was that it took a lot more people besides the sales force to keep this company operating efficiently.

The employees were paid every two weeks, so their time cards were printed with one week on each side. The department Doug would be working in worked a five-day, 40-hour week. Each day had two IN spaces and two OUT spaces. Employees were expected to punch in by 8 a.m. and then work until 5 p.m. before punching out. This gave them an eight-hour day as they were expected to take one-half hour for lunch and two one-fourth hour coffee breaks, but were not required to punch the clock whenever they did take them. If they returned to work in the evening because of rush season, they would use the second set of IN-OUT spaces provided on the card. Any time worked over 40 hours per week was considered overtime, and they were paid for this at one and one-half times their usual rate.

Doug would be computing all the necessary information for three employees in the shop. His first task would be to complete their time cards. So, for each of the following people, find the time they worked each day. Don't forget to subtract one hour for lunch period and coffee breaks; also, round the hours worked daily to the nearest quarter hour.

RALPH SZYLINSKI

FIRST WEEK

7:56	IN	MON	1.
5:01	OUT		
	IN		
	OUT		
7:55	IN	TUE	2.
5:30	OUT		
	IN		
	OUT		
8:05	IN	WED	3.
5:06	OUT		
	IN		
	OUT		
9:00	IN	THU	4.
4:58	OUT		
	IN		
	OUT		
7:49	IN	FRI	5.
4:57	OUT		
	IN		
	OUT		

RALPH SZYLINSKI

SECOND WEEK

7:31	IN	MON	6.
3:05	OUT		
5:48	IN		
8:02	OUT		
7:46	IN	TUE	7.
5:02	OUT		
	IN		
	OUT		
7:58	IN	WED	8.
4:30	OUT		
	IN		
	OUT		
10:05	IN	THU	9.
5:38	OUT		
	IN		
	OUT		
7:56	IN	FRI	10.
4:59	OUT		
	IN		
	OUT		

MAUREEN LIBERSANSKI

FIRST WEEK

7:58	IN	MON	11.
5:01	OUT		
	IN		
	OUT		
8:02	IN	TUE	12.
4:59	OUT		
5:49	IN		
8:45	OUT		
8:03	IN	WED	13.
5:02	OUT		
	IN		
	OUT		
8:09	IN	THU	14.
5:05	OUT		
	IN		
	OUT		
7:57	IN	FRI	15.
5:03	OUT		
	IN		
	OUT		

MAUREEN LIBERSANSKI

SECOND WEEK

9:00	IN	MON	16.
5:30	OUT		
	IN		
	OUT		
7:59	IN	TUE	17.
6:02	OUT		
	IN		
	OUT		
7:45	IN	WED	18.
5:29	OUT		
	IN		
	OUT		
7:58	IN	THU	19.
5:06	OUT		
	IN		
	OUT		
7:48	IN	FRI	20.
5:13	OUT		
	IN		
	OUT		

THOMAS SMITH

FIRST WEEK

7:44	IN	MON	21.
5:05	OUT		
	IN		
	OUT		
7:58	IN	TUE	22.
5:32	OUT		
	IN		
	OUT		
7:49	IN	WED	23.
5:00	OUT		
	IN		
	OUT		
7:59	IN	THU	24.
5:28	OUT		
	IN		
	OUT		
7:50	IN	FRI	25.
5:02	OUT		
	IN		
	OUT		

THOMAS SMITH

SECOND WEEK

7:49	IN	MON	26.
5:17	OUT		
6:32	IN		
8:59	OUT		
7:48	IN	TUE	27.
5:10	OUT		
	IN		
	OUT		
7:47	IN	WED	28.
3:45	OUT		
5:02	IN		
8:20	OUT		
7:46	IN	THU	29.
5:22	OUT		
	IN		
	OUT		
7:48	IN	FRI	30.
5:01	OUT		
	IN		
	OUT		

UNIT 14-6

Once Doug had computed the hours from the time cards, he had to calculate the total wages for each of the three. To do this, he had to transfer the information from the time cards to a payroll form. He added the total regular wages for a two-week period to find what the regular wages would be, and then added the overtime (the overtime rate is 1½ times the regular rate). Once he had all of this, he added the two items to find the total wages.

Fill out the payroll form Doug used. Use the information on the three time cards.

	WEEK ENDED	HOURS							Regular Time	Over-Time	RATE		Regular Wages	Overtime Wages	Total Wages
		SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.			Amount	Per.			
M.L. 1	7/10								31.	32.					
2	7/17								33.	34.					
								Totals	35.	36.	3 25		37.	38.	39.
R.S. 1	7/10								40.	41.					
2	7/17								42.	43.					
								Total:	44.	45.	4 05		46.	47.	48.
T.S. 1	7/10								49.	50.					
2	7/17								51.	52.					
								Total:	53.	54.	3 75		55.	56.	57.

Now that Doug had determined the total wages for these three people, he calculated their deductions. Doug wasn't aware of all the possible items employees could have deducted from their checks. The deductions that Doug had to be careful about were:

1. Health Insurance: For each employee, Mr. Samuel paid 3/4 of the premium. That meant that those on family plan had $4.33 deducted every two weeks and those on single coverage had to pay $1.71 every two weeks.

2. Income Protection Insurance: This was protection to insure the continuation of wages in case of serious illness that incapacitated a person. Mr. Samuel paid half the premium. This left 17 cents per $100 earned to be paid by the employee desiring coverage.

3. Union Dues: For the clerks' union, a flat $2 per paycheck was deducted.

4. Payroll Savings Plan: This depended upon the individual employee, both as to the type of plan and the amount.

5. Employee's Retirement Association: All employees belonged to this association as well as Social Security. This means that 3.8 percent of their salary was invested in their account.

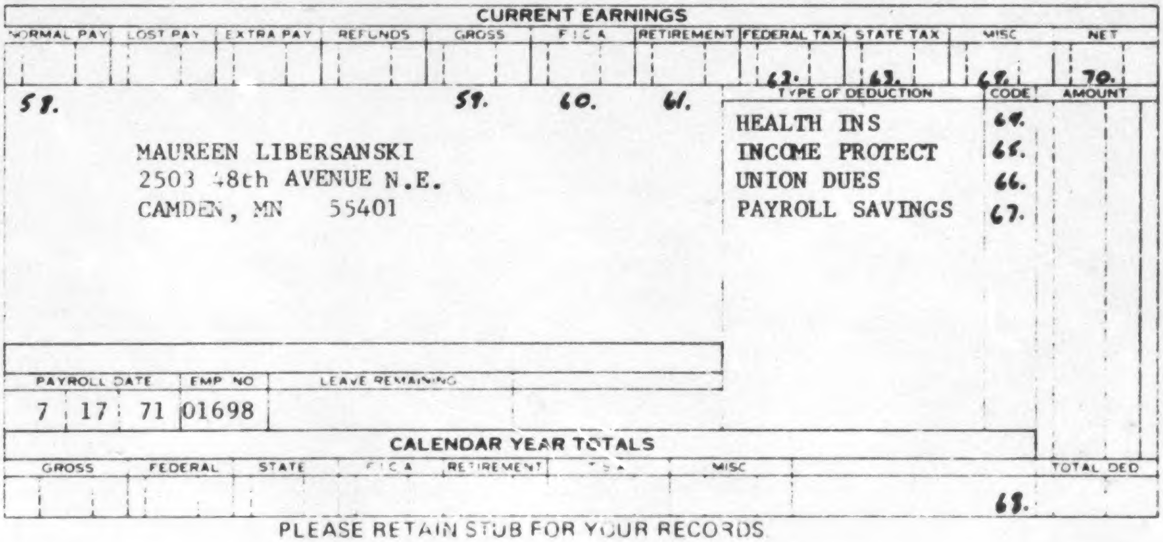
6. Federal Withholding Tax (Income Tax): This was their federal income tax, and the amount deducted could be obtained from tables in Circular E, Employer's Tax Guide, published by the Department of Treasury.

7. FICA (Social Security): This was a straight 5.2 percent of each employee's salary, until he had earned an excess of $7,800 from the same employer in a given year. These deductions could be obtained from the same Circular E as above.

8. Minnesota Withholding Tax (Income Tax): This state income tax deduction could be determined from the state tables.

Now that Doug had learned just what all the various deductions were, he was ready to get started in calculating the net pay for these three employees.

Maureen Libersanski was single (one exemption) and she participated in the health insurance and income protection insurance. She belonged to the clerk's union and had a payroll savings plan of $10 per paycheck. All other deductions are not optional. (Normal pay and gross are the same; total deduction and miscellaneous are the same; all these must be subtracted from the gross to determine the net, or TAKE-HOME, PAY.)



CURRENT EARNINGS

NORMAL PAY	LOST PAY	EXTRA PAY	REFUNDS	GROSS	F I C A	RETIREMENT	FEDERAL TAX	STATE TAX	MISC	NET
58.				59.	60.	61.	62.	63.	69.	70.

MAUREEN LIBERSANSKI
2503 48th AVENUE N.E.
CAMDEN, MN 55401

TYPE OF DEDUCTION	CODE	AMOUNT
HEALTH INS	64.	
INCOME PROTECT	65.	
UNION DUES	66.	
PAYROLL SAVINGS	67.	

PAYROLL DATE	EMP NO	LEAVE REMAINING
7 17 71	01698	

CALENDAR YEAR TOTALS

GROSS	FEDERAL	STATE	F I C A	RETIREMENT	T S A	MISC		TOTAL DED
							68.	

PLEASE RETAIN STUB FOR YOUR RECORDS

Ralph Szylinski: Married, with two children, but Ralph claimed only two exemptions. He participates in health insurance and income protection insurance plans. He has no payroll savings plan but is a strong union member, having been the president of his local for two years. Compute Ralph's take-home pay.

CURRENT EARNINGS

NORMAL PAY	LOST PAY	EXTRA PAY	REFUNDS	GROSS	F.I.C.A.	RETIREMENT	FEDERAL TAX	STATE TAX	MISC.	NET
71.	▨	▨	▨	72.	73.	74.	75.	76.	81.	82.

RALPH SZYLINSKI
14 82nd PLACE
MAGNOLIA, MN 55409

TYPE OF DEDUCTION	CODE	AMOUNT
HEALTH INS	77.	
INCOME PROTECT	78.	
UNION DUES	79.	

PAYROLL DATE			EMP. NO.	LEAVE REMAINING
7	17	71	16932	

CALENDAR YEAR TOTALS

GROSS	FEDERAL	STATE	F.I.C.A.	RETIREMENT	T.S.A.	MISC.		TOTAL DED.
▨	▨	▨					80	

PLEASE RETAIN STUB FOR YOUR RECORDS.

UNIT 14-6

Thomas Smith: Single, Tom declares 0 exemptions for tax purposes. He subscribes to both the health plan and the income protection plan and has a payroll savings plan of $15.75 per check. He doesn't believe in what the union is trying to do so he has refused to join.

NORMAL PAY	LOST PAY	EXTRA PAY	[illegible]	STATE	F.I.C.A.	RETIREMENT	[illegible]	[illegible]	[illegible]	NET
83.				84.	85.	86.	87.	88.	93.	94.

THOMAS SMITH
7890 49th AVENUE NORTH, APT. 206
NEW ASP, MN 55108

TYPE OF DEDUCTION	CODE	AMOUNT
HEALTH INS	89.	
INCOME PROTECT	90.	
PAYROLL SAVINGS	91.	

PAYROLL DATE			EMP. NO.	LEAVE REMAINING
7	17	71	21693	

CALENDAR YEAR TOTALS

GROSS	FEDERAL	STATE	F.I.C.A.	RETIREMENT	T.S.A.	MISC.		TOTAL DED
							92.	

PLEASE RETAIN STUB FOR YOUR RECORDS.

Doug was amazed that so much went into calculating someone's paycheck. It was interesting to know what he was paying for and what items were being paid for by his employer. Doug looked forward to his advancement to the payroll department in a month or so. In the meantime, he returned to his regular job, which was a bit simpler, to be sure!